metals review

the news digest magazine

published by the american society for metals

Volume XXVII-No. 11 November, 1954

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WHY?

MORE FOR YOUR MONEY

PATENTS ISSUED—OTHERS PENDING:

2,002,180 — 2,046,822 — 2,188,063 — 2,237,434 — 2,249,581 — 2,252,319 — 2,299,186 — 2,309,745 — 2,338,433 — 2,347,400 — 2,349,767 — 2,354,753 — 2,370,959 — 2,370,960 — 2,394,777 — 2,395,329 — 2,395,614 — 2,400,511 — 2,415,493 — 2,415,494 — 2,421,224 — 2,426,773 — 2,431,479 — 2,474,674 — 2,464,508 — 2,477,561 — 2,512,206 — 2,516,516 — 2,537,830 — 2,601,864.

SALES 80% PLUS:

As a matter of interest to you, a minimum of 80% of Holden products, whether applied to furnace or salt baths, are manufactured under patents issued or pending.

FOREIGN COUNTRIES:

In many of the foreign countries Holden products are covered by issued patents—this is more practically true of countries which are our allies—Canada, Great Britain, France, Italy, South Africa, Australia, Sweden, Brazil and others.

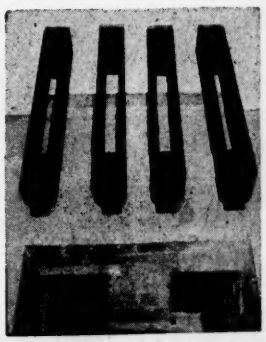
More For Your Money Means Basically The Following:

1. Production of furnace equipment which has lower maintenance cost than any competitive type of salt bath equipment, regardless of the method of heating.

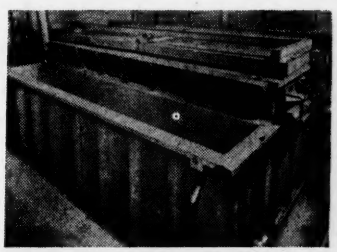
2. A minimum of down time regardless of type of heating, therefore, more production for the same dollar of original purchase.

3. In many cases, the designs as developed for electrical electrode furnaces have indicated 15 to 20% greater productive use or savings when these principles are applied to competitive furnaces.

(See Back Cover)



Type 701-4 Submerged Electrode Unit with ceramic pot for neutral hardening and annealing 1000-2300°F.



Aluminum Heat Treating

Desanding—Descaling 18,000 lbs. per hr.—1800 KVA

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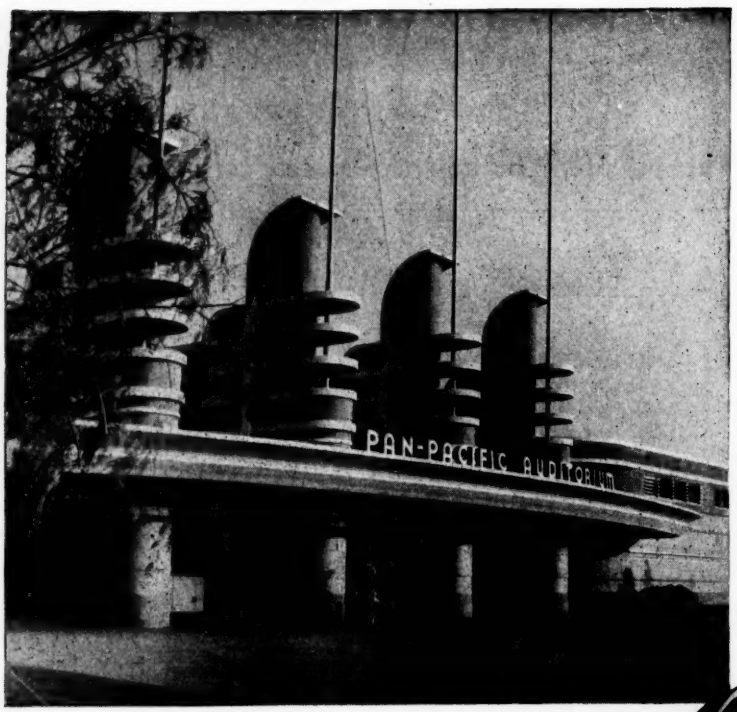
'55 WESTERN METAL EXPOSITION and CONGRESS



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MARCH 28—APRIL 1, 1955

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9th of a distinguished and successful series of Western Metal Expositions . . . the 1955 event promises even greater rewards . . . for exhibitors and visitors alike, than have ever before been achieved in these time-proved events! Months away . . . interest has sharpened and activity has mounted to indicate a record-breaking number of products and services displayed before record-breaking audiences . . . historic proof of the outstanding significance of these great Metal Shows!

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Metals Review

THE NEWS DIGEST MAGAZINE

VOLUME XXVIII, 11 November, 1954

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IMPORTANT LECTURES

DEPARTMENTS

ASM REVIEW OF METAL LITERATURE

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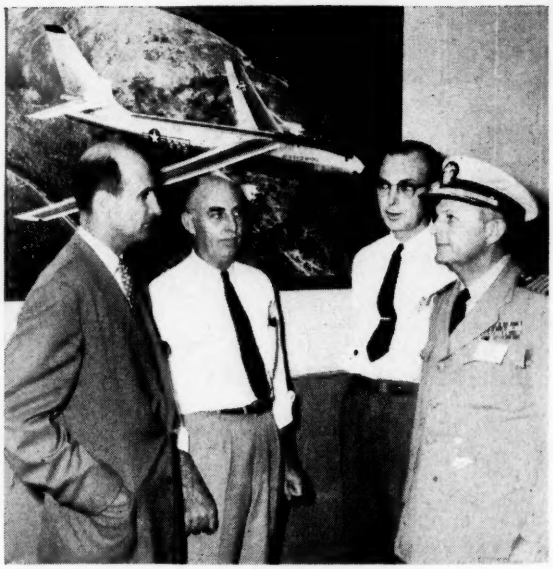


Southern Metals Conference

Attracting a top quality registration of 144, the Ninth Annual Southern Metals Conference, held in Atlanta, Ga., in September, featured active participation by representatives of the eight sponsoring southeastern A.S.M. Chapters.

Speakers representing the Birmingham, Carolinas, Chattanooga, Jacksonville, New Orleans, Oak Ridge and Savannah River Chapters, supplemented by extensive plant tours of Atlanta's Ford Motor Co. and Atlantic Steel Co., and Lockheed Aircraft Corp., Marietta, Ga., effectively emphasized the conference theme—"Diversification of the Southern Metalworking Industry".

James B. Austin, A.S.M. president, and assistant vice-president, fundamental research, U. S. Steel Corp., Robert J. Raudebaugh, national trustee, and James T. McKenzie, past national trustee, were guests for the entire four days of the conference.

Birmingham Chapter's representative G. S. Sangdahl, Jr., metallurgical engineer, Chicago Bridge and Iron Co., Birmingham, presented an interesting discussion and color movies of U. S. Steel—Chicago Bridge joint tests on commercial pressure vessels made from Carilloy T-1, a new high yield strength alloy steel. Discussion and movies demonstrated the fitness of quenched and tempered plate for the construction of pressure vessels, the propriety of utilizing the great strength potential of this type of steel and the desirability of designing on the basis of yield strength rather than ultimate strength.

Carolina Chapter's Albert Fairchild, metallurgical engineer, Western Electric Co., Winston-Salem, N. C., discused "Metallurgical Considerations and Controls of Thermal Unions of Metals" in relation to aircraft quality metal joining. Processes, fusion welding, controls, brazing, soldering and distortion were described and discussed.

Chattanooga Chapter representative Walter C. Long, assistant director, Tennessee Industrial and Agricultural Commission, Nashville, highlighted metalworking and general industrial developments in Chattanooga and other metalworking centers of the state.

Jacksonville's Thomas W. Peacock, superintendent, Florida Machine and Foundry Co., presented a discussion on the tremendous growth

Above Left: During a Plant Tour Taken as Part of the Southern Metals Conference, a Lockheed Aircraft Corp. Supervisor Shows H. C. Fasig Jr., Robert A. Shropshire, Jr., and S. A. Shuford, of Oerlikon Tool & Arms Corp., a B-47 Engine. At Right: Ralph Osborn (left), Director of Materiel, Lockheed Aircraft Corp., John T. Butler, Georgia Chairman, Michael Wiedl, Conference Chairman and Georgia Secretary, and Captain C. A. Printup, Commanding Officer of the Naval Ordnance Plant in Macon, discuss Mr. Osborn's talk "Procurement Policies of the Georgia Division". Speakers at the Conference included, from left: L. A. Abrams, G. S. Sangdahl, Jr., Albert R. Fairchild, Robert J. Raudebaugh, Thomas J. Dawson and Peter Patriarca. (Photographs by Richard L. Priess)

Southern Metals Conference (continued)

in metalworking activity in that area. Conference members were surprised to find the country's leading manufacturer of aluminum doors, windows and jalousies is located in Miami.

New Orleans representative, T. J. Dawson, chief metallurgist and director of research, Ingalls Shipbuilding Corp., Pascagoula, Miss., presented a highly interesting talk on "Quality Control of Heavy Weldments".

Oak Ridge chairman, Peter Patriarca, metallurgist, Oak Ridge National Laboratory, presented a talk on "Welding Practice at Oak Ridge National Laboratory". He discussed procedures used to successfully fabricate a number of complex heat exchangers for unusual and extremely rigorous service conditions. The selection of joining materials and methods was based on results of welding and brazing research for elevated temperature applications. Results revealed the importance of coordination of effort between research and production.

Savannah River's Leonard A. Abrams, materials engineer, Reactor Materials Branch, A.E.C., Augusta, Ga., showed why the operation of nuclear reactors has posed many new materials problems for the metallurgist. The behavior of materials of construction—fuels, targets, moderators and controls, present unique problems.—**Reported by Richard L. Priess of the Georgia Chapter.**

New Films

Welding a Stronger Fleet

The Naval Research Laboratory, Washington 25, D. C., has available a 16-mm. sound, color film of explosion tests of weldments. This film shows tests being conducted on weldments, and how various alloy steels, mild steels and aluminum weldments behave and how they fail. It explains the engineering significance of weldability and the importance of metallurgical factors. Requests should be sent to W. S. Pellini, Superintendent, Metallurgy Division.

Iron Ore From Cerro-Bolivar

A documentary film in Kodachrome of the discovery, development and operation of a United States Steel iron ore mine in Venezuela, has been released by U. S. Steel and is available on a loan basis to technical and educational organizations. For further information write to: U. S. Steel Corp.'s district offices, or to U. S. Steel Corp., Motion Picture and Visual Aids Section, 525 William Penn Place, Pittsburgh 30, Pa.

Machining Steels Topic at Indianapolis

William H. Splinter, Machinability Engineer, Republic Steel Corp., Discusses His Talk With Members of the Indianapolis Chapter. From left: G. Sippel, E. Tuttle, secretary and acting chairman, and Mr. Splinter

Speaker: William H. Splinter

Republic Steel Corp.

An overflow audience heard William H. Splinter, machinability engineer for Republic Steel Corp. and its subsidiaries, present a talk on the "Machinability of Steels" in **Indianapolis.**

Mr. Splinter stressed the point that 95% of all toolsteel difficulties are attributed to improper grinding and/or design. It is not always a fault of the material or of the machine that causes machining problems. Variables such as the cutting fluid, type of tool, grade of toolsteel used, steelmaking practice employed and the machine operator can be directly or indirectly responsible for many machining problems encountered by industry.

Mr. Splinter stressed the fact that feed is the production meter, not speed. In his numerous trips through the plants of the country, he is always asked what can be done to increase the speed to increase production. No one ever asks about changing the feed. A slight adjustment to the feed can, in many instances, improve tool life and increase production output.

Carbide cutting tools are thought by many to be the means of eliminating all machining problems. Great advances have been made in carbide tools over recent years and they have easily cut steels of 410 Brinell; however, carbide tools are no panacea and have been outperformed on certain jobs by high speed steel. The one great hindrance, perhaps, to the over-all adoption of carbide tools, is the fact that many of the machines in use today are not capable of adaptation to the use of carbide tools. Machines employing carbide tools must be capable of high speeds and able to maintain tool rigidity for adequate production.

Mr. Splinter advised against turning to hot rolled steel in screw machines to obtain cost savings on materials. Hot rolled material will scale easily and may cause the coolant used to become abrasive, thus causing additional spending to eliminate the problem. Also, hot rolled material is not necessarily conducive to good machining.

To machine properly and economically, the right type of machine must be used and it must be in good condition to do the job within tolerances. Tool angles are very important and the tool angles to be considered are those which are formed with the work and not with respect to the tool itself.—**Reported by Robert J. Fesko for the Indianapolis Chapter.**

Brazil Metal Meeting

The Brazilian Society for Metals has extended an invitation to A.S.M. members to join its annual meeting from Dec. 6 through Dec. 11, 1954, in Sao Paulo, Brazil. The meeting will feature technical papers by well-known international metallurgists, including General Edmundo de Macedo Soares e Silva, well-known for his accomplishments in the Brazilian iron and steel industry, who will speak on the "Technical Basis of the Latin American Metallurgical Industry," and Dr. Franz Rapatz, German specialist in alloy steels, who will present a talk entitled "Continuous Casting and Use of Oxygen in the Iron and Steel Industry".

● has established a Visiting Lectureship for lecturing and holding seminars on engineering subjects pertaining to metals technology.

A.S.M. Sauveur—Research Awards Given

Sauveur Medal

The 1954 Albert Sauveur Medalist, Alexander L. Feild, is associate director, research division, Armco Steel Corp., in charge of the company's stainless steel section. The Medal was given to Dr. Feild, an authority on stainless steel, in recognition of his pioneering metallurgical achievements which have stimulated organized work to such an extent that a marked basic advance in metallurgical knowledge has been made.

Dr. Feild is a graduate of the University of North Carolina and holds a Ph.D. degree from Stevens Institute of Technology. During World War I, Dr. Feild was research metallurgist with the Bureau of Mines in Pittsburgh and later held positions as research metallurgist with Union Carbide and Carbon Corp. and Central Alloy Steel Corp. In 1940, Dr. Feild received a Modern Pioneer Award for inventions relating to the rustless process for melting stainless steel.

The Albert Sauveur Achievement Award was established by A.S.M. in 1934 to perpetuate the memory of Dr. Sauveur, late Harvard University professor and "Dean" of American metallurgists.

Science Achievement Award

William E. Umstattd, president of Timken Roller Bearing Co., was presented the 1954 A.S.M. Medal for the Advancement of Science during the annual meeting of the Society on Nov. 4 in Chicago, for his efforts in convincing many of the importance of uninterrupted metallurgical research. His foresight and influence in making funds available have helped substantially the arts and sciences related to metals.

Mr. Umstattd began his association with Timken in 1919 as an employee in the inspection department, after serving as a Captain in World War I. He was made assistant superintendent of the Bearing Division in 1922, and was named factory manager in 1929. He advanced to executive vice-president in 1932, and was elected president in 1934.

Endowed with a pioneering spirit and the courage to back his judgment, Mr. Umstattd demonstrated his faith in research and development early in his career. Under his sponsorship and direction, Timken undertook the successful development of a detachable rock drilling bit, pioneered in the development of roller bearings for steel mills, industrial applications and railway locomotives and rolling stock. More recent pioneering ventures resulted in the development of manufacturing methods for a line of high-precision bearings and the first installation in this country of an induction stirrer on a Steel and Tube Division's steelmaking furnace.

He was directly responsible for the formation of Timken's Manufacturing Research Division and followed with great interest their contributions in machines, manufacturing procedures and handling methods. To illustrate his versatility, he has personally pushed the development of equipment which would allow the employment of the physically handicapped, including the blind, and for these efforts the Company has won several awards. Personal interest and support of a project to determine the motivating factors in routine inspection jobs emphasizes the breadth of his interest in research and development.

Besides maintaining an active research group within the organization, Timken has sponsored research at several of the country's leading research laboratories and metallurgical institutions. For example, a continuous research program on high temperature steels has been carried on at the University of Michigan for over 25 years, and graduate fellowships have been maintained at two of the leading metallurgical institutes for several years. These accomplishments and endeavors have had Mr. Umstattd's support and blessings because of his belief in the importance of research and development to Timken's future.

Teaching Awards

The A.S.M. paid tribute to three teachers, who, in the Society's opinion, are doing an exceptional job of teaching metallurgy. This year, the $2000 teaching awards were presented during the annual banquet of the Society to:

MAURICE J. SINNOTT, associate professor of chemical and metallurgical engineering, University of Michigan. Prof. Sinnott began his teaching career in 1944. His industrial background includes two years as plant metallurgist with Great Lakes Steel Corp. and senior research engineer for Goodyear Aircraft Corp. He received his B.S. and M.S. degrees in chemical engineering from Michigan and his Ph.D. in metallurgical engineering in 1946. His academic experience includes a research assistantship in high-temperature metallurgy and a teaching fellowship in chemical and metallurgical engineering, both at University of Michigan.

ELE EUGENE STANSBURG, professor of metallurgical engineering, University of Tennessee. Prof. Stanburg has devoted his entire professional career to teaching metallurgy. He received his B.S. degree in chemical engineering from North Carolina State College, and his M.S. and Ph.D. degrees from University of Cincinnati, where he was instructor in metallurgical engineering from 1942 to 1946. In 1946 he was appointed assistant professor of metallurgical engineering at the University of Tennessee, advancing to an associate professorship in 1947, and to a full professorship in 1952.

JOSEPH F. LIBSCH, professor of metallurgy, Lehigh University. Prof. Libsch has been teaching since 1942. A graduate of M.I.T., he received his M.S. and Ph.D. degrees there. From 1941 through 1945, he served in the Ordnance Department of the Army, assigned to metallurgical research and development of small arms. For seven months of this period he was an instructor in metallurgy at Northeastern University. In 1946 he joined the faculty of Lehigh, advancing to a full professor this year. Prof. Libsch has been a consulting metallurgist for Lepel High Frequency Laboratories since 1945, and is the author of many published articles. He is presently chairman of A.S.M.'s Advisory Committee on Metallurgical Education.

Howe Medal

The Henry Marion Howe Medal for 1954 was awarded to H. J. Beattie, Jr., physicist, Thomson Laboratory, and F. L. VerSnyder, supervisor, Metallography and High-Temperature Testing Unit, Small Aircraft Engine Laboratory, General Electric Co., for their paper "Microconstituents in High-Temperature Alloys" published in A.S.M. *Transactions,* Vol. 45, 1953.

Salt Baths Topic at Phoenix

Speaker: A. F. Holden

A. F. Holden Co.

The **Phoenix Area Chapter** heard A. F. Holden of the A. F. Holden Co., speak on "General Technical Structure of Salt Baths" at its first meeting of this season.

Mr. Holden thoroughly covered neutral baths, carburizing baths, brazing and austempering-martempering. A lively discussion period was held at the conclusion of the talk.—**Reported by Gene Schwetz for Phoenix.**

Navy Concludes Course

An intensive 10-day training course for inspection personnel, designed to improve the quality of inspection of metallic materials and to insure satisfactory quality of materials purchased under Navy procurement, has recently been concluded at the Office of Naval Materials Laboratory at Munhall, Pa. The course, covering every phase of metals inspection, was developed largely by W. R. Angell, laboratory director, and B. B. Rosenbaum, head of the Metallurgical Division.

OBITUARIES

N. A. ZIEGLER, active for many years in metallurgical research and development, died late in August as a result of a stroke. He had been associated with the Crane Co. as supervisor of metallurgical research since 1936.

Mr. Ziegler and T. D. Yensen were recipients of the A. S. M. Howe Medal in 1935 for their paper on the "Magnetic Properties of Iron as Affected by Carbon, Oxygen and Grain Size".

JOSEPH F. BREHL, sales engineer for Blaw-Knox Co., National Alloy Division, died of a heart attack in September. He was a member of the Pittsburgh Chapter.

JOHN HUNTER NEAD, who was metalllurgical consultant to the president of Inland Steel Co. until his retirement a few years ago, died at his home in Chesterton, Ind., in September.

J. H. Nead

Mr. Nead, a past chairman of the Iron and Steel Division of the American Institute of Mining and Metallurgical Engineers, had served previously in various capacities at Inland Steel Co., and as chief metallurgist for the American Rolling Mill Co. and the Minneapolis Steel & Machinery Co. He was active in many technical societies in the United States and Great Britian.

T. C. BRADFORD, New England representative for the Anderson Oil Co. for 17 years and field technical engineer for the past seven, died recently while on vacation. Mr. Bradford was a member of the Worcester Chapter.

R. M. ATWATER, chief engineer at Ingersoll Steel Division for the past 20 years, died in October as a result of a coronary occlusion. Mr. Atwater, an active member in many civic activities, was a consulting engineer for numerous midwest firms before joining Ingersoll.

VICTOR A. HANSEN, a chapter member of the Carolinas Chapter, and vice-president and general manager of the Precision Gear and Machine Co., Charlotte, N. C., was killed in an automobile accident in August.

Mr. Hansen was a member of the Board of Directors of Turner Manufacturing Co. and was first vice-chairman of the Piedmont Chapter, American Society of Tool Engineers.

Talk on Ordnance Steels at Boston

A. Hurlich and J. F. Wallace, Watertown Arsenal, Presented a Discussion on "Ordnance Steels" at a Meeting of the Boston Chapter Which Was Held at the Museum of Science. Shown are, from left: Morris Cohen, chapter chairman; Mr. Hurlich; J. L. Martin, technical chairman: and Mr. Wallace

Speakers: A. Hurlich and J. F. Wallace

Watertown Arsenal

A meeting of the **Boston Chapter** featured talks by A. Hurlich, chief of the materials engineering division, and his colleague, J. F. Wallace, director of the Rodman Laboratory, Watertown Arsenal. Mr. Hurlich discussed the "Requirements and the Development of Specifications for Tough Steels Intended for Ordnance Applications," while Mr. Wallace described the "Metallurgical Practices" by which requirements may be met.

Presenting the army's 75-mm. Skysweeper anti-aircraft gun as an illustration, Mr. Hurlich outlined a variety of service conditions including firing stresses on gun tubes and breech blocks, and shock loading of fabricated outriggers, which demand high-quality steels capable of withstanding severe impact at temperatures down to −65°F. Data gathered from full-scale drop tests as well as Charpy V-notch tests demonstrate superiority of tempered martensite over bainite for low-temperture impact service of ordnance constructional steels. Ballistic tests on armor plate also clearly demonstrate the need for full quenching to attain maximum energy absorption at extreme subzero temperatures. Transition curves obtained with Charpy V-notch specimens show an accurate correlation with behavior of ordnance steels in service.

Best arc welding practice from the standpoint of toughness at subzero temperatures calls for low-hydrogen mineral-coated electrodes in preference to cellulose-coated. Such electrodes provide a substantial saving in important alloying elements in contrast to the richly alloyed austenitic electrodes formerly used for welding armor plate.

Mr. Wallace, in demonstrating how toughness may be attained in ordnance steels at high strength levels, emphasized careful blooming practice for forgings and directional solidificatinn in castings to assure internal soundness. Fine grain produced by residual aluminum contents of 0.02 to 0.06% and avoidance of inclusions were suggested as measures to promote toughness. Vanadium (0.10%) will also promote fine grain and at the same time improve forgeability of steels or fluidity of castings.

Deep hardening steels capable of quenching out to a minimum of 80% martensite are necessary to produce the tempered martensitic structure required for toughness at low temperatures. Nickel-chromium-molybdenum steels (a 2 to 1 ratio of Ni to Cr and 0.25 to 0.60% M) are recommended for hardenability and mitigation of temper brittleness. Manganese should be 0.6 to 0.8% and carbon 0.25 to 0.40% for toughness without quench cracks. Phosphorus should be below 0.02% and sulphur below 0.03% for best impact strength.

Discussing practical heat treatment, Mr. Wallace emphasized the importance of studying accurate TTT-curves for the material to establish sound heat treating practice. The highest possible tempering temperature and shortest possible time are recommended.—**Reported by Martin B. Graham for Boston Chapter.**

At the request of the Metallurgical Advisory Board the ⊖ now acts in an advisory capacity to the Defense Department by appointing committees to prepare reports and suggestions on assigned problems.

Describes Iron Powder Metallurgy

John A. Comstock (Center), Chief Metallurgist, Easton Metal Powder Co., Described the "Engineering Properties of RZ Iron Powders" at a Meeting of the Des Moines Chapter. He is shown with W. A. Granquist (left), chapter chairman and C. S. Rutherford, vice-chairman of the chapter

Speaker: John A. Comstock
Easton Metal Powder Co., Inc.

The **Des Moines Chapter** heard John A. Comstock, chief metallurgist of Easton Metal Powder Co., Inc., discuss the "Engineering Properties of RZ Iron Powders".

The process of manufacturing iron powder from steel by atomization, known as the RZ process, was developed by the Germans during World War II specifically for the production of iron powder driving bands for shells. The designation RZ is taken from "Roh Zinder", meaning raw scale. During the process of atomizing with air the individual atomized particles are oxidized similar to mill scale—thus the name RZ.

RZ powders are made by melting carbon steel scrap in a cupola after which a stream of molten iron is atomized by a stream of air. Next, the water quenched particles are thickened, filtered, dried, ground, blended and reduced prior to packaging. During the cupola melting of the steel scrap, all impurities are removed except carbon. The carbon is maintained at a high level to produce hollow globules in atomizing. The oxygen of the air stream reacts with iron and also combines with the carbon to blow up the powder due to CO pressure.

During milling a perforated take-off tube above the mill allows control of the particle size by air separation. The higher the take-off point, the finer the powder. At this stage the powder is brittle and contains 1½ times as much oxygen as carbon.

During the reducing annealing cycle, the walking-beam globar furnaces are fed by automatic feeders from the storage bunkers. The powder is weighed and charged onto paper placed in the trays to prevent sticking. The reduction annealing temperature ranges from 1000° to 1200° C. In general, the lower the annealing temperature, the lower the hardness of cake produced.

During hammer milling after annealing, the cake is broken down but there is no appreciable work hardening or deformation of the particles. The apparent density of the powder is controlled by the screen size from the hammer mill.

RZ powder is made for four major purposes: Molding of small parts; flame cutting of stainless steels and refractory materials; welding electrode coatings; and for chemical uses.

A typical powder for molding would analyze:

0.08 C	0.025% S
0.15% Mn	0.015% P
0.05% SiO_2	0.7% hydrogen loss

Apparent density of this powder is closely controlled at 2.4 ± 0.02 g/cc. Close control is necessary to control amount of powder to the die.

The rate of flow is approximately 30 seconds for 50 grams. This is important to control the uniformity of filling a cavity.

Molding powders should have good green strength so the compact may be handled and sharp corners maintained. Coarser powders have better green strength than fine powders. Finer powders result in better sintered strength than do coarser powders.

Iron powders are used in cutting torches to cut stainless steel. Carbon and low alloy steels are commonly cut with oxygen acetylene torch. Such a torch will not cut stainless steels because of the refractory oxide produced. By adding iron powder to the stream the refractory oxide is floated off as a slag allowing stainless to be cut. Typical applications are:

1. Cutting of gates and risers from castings.
2. Cutting up massive scrap.
3. Washing out of surface defects.
4. Profile cutting.

In profile cutting, a fast burning fine powder is used to give a pencil-like concentrated flame. Powder for washing out casting defects burns slowly and gives a bushy flame.

RZ powder in electrode coatings improves welding by increasing welding speed, decreasing fringe cracking and reducing skill required for welding. The carbon content must be kept low so ductile welds may be produced.

In conclusion, the future magnitude of the iron powder industry is dependent on technological development which will bring the cost of iron powder down so its use will become more and more attractive and open up new fields of application. The RZ process has many interesting features, not the least of which is low cost and adaptability to mass production methods. Made from scrap steel, RZ iron powder costs reflect market conditions. Thus, for the first time, there is an iron powder which will currently compete in the metal market.

The design engineer will specify the sintered strength and density which he requires, the production engineer will be interested in the pressing loads required to obtain these densities as affecting his die life, and both are interested in uniformity of fabrication and finish properties. The most useful iron powder will be the one which will produce the desired strength of part with the least weight and requiring the least compacting pressure.—**Reported by R. G. Middleton for Des Moines.**

Canada's Post-War Navy Plans Outlined

Speaker: J. G. Knowlton
Royal Canadian Navy

"Canada's Post-War Navy" was the subject of the talk given by Rear Admiral J. G. Knowlton, chief of naval technical services, Royal Canadian Navy, before the **Ottawa Valley Chapter** on Sustaining Members Night.

Adm. Knowlton stressed the highly possible but little publicized mode by which Canada could be attacked —via submarine. Canada's Navy has therefore been designed to combat such an attack, with emphasis being placed on anti-submarine vessels fitted with detection devices as well as carrier-borne aircraft. To this end, highly trained technical personnel have been brought together and much of the design work in the construction program has been entirely Canadian after adoption of the best features of British and American practice. The production of ships and equipment entirely within Canada has been one of the chief aims, and for this many special production facilities have been installed. The program of construction of Canada's post-war Navy is well in hand in spite of many difficulties, each of which is being overcome as it arises. —**Reported by D. A. Scott for Ottawa Valley.**

Minnesota Presents Panel On Various Type Coatings

The **Minnesota Chapter** held a panel session on "Corrosion Protection of Metals by Coating" at its opening meeting this season. Speakers included John Kaiser of Seeger Refrigerator Co., who spoke on "Porcelain Enameling of Metals"; Russell Omdahn of Minneapolis-Honeywell Regulator Co., who discussed "Paints"; Ed Meister, Parker Rustproof Co., whose subject was "Phosphate and Chromate Coatings"; Jerry Weller of Minneapolis-Honeywell, who spoke on "Plating in General and Coloring of Steel"; and Fred Kaim of Superior Plating, who chose "Anodizing" as his subject.

Each speaker presented the various aspects of his particular field in regard to preparation of the base metal and processing, application and limitations of the coating or plating. Each pointed out that the type of finish depends mainly on the application and the economies or relative costs of the processes.

Also mentioned was the relatively new process of plating—electroless nickel. This process, still in the development stage, has excellent possibilities in corrosion applications where mating parts or internal surfaces must be plated, its particular advantage being that the plating is uniform and size changes in the order of 0.0001%.—**Reported by Lyle D. Gutsche for Minnesota Chapter.**

Austin Joins News Editor As Guest at the Carolinas

Speaker: Reed Sarratt

Winston-Salem News Editor

James B. Austin, A.S.M. national president, presented an address, "Metals of Tomorrow", before a meeting of the **Carolinas Chapter** held recently. Dr. Austin concluded his talk by bringing members up-to-date on A.S.M. activities.

Reed Sarratt, editorial director of the Winston-Salem papers, coffee speaker for the evening, discussed the recent decision of the Supreme Court in the public school cases. He presented the decision against its historical background and traced the key decisions which led to the ruling that segregation in the public schools is unconstitutional.

In commenting on the future, Mr. Sarratt pointed out that, in general, the severity of the reaction to the decision has been and probably will be in direct proportion to the number of Negroes in the population. He expressed the opinion that segregation will continue to exist in practice long after the decision has been accepted in principle everywhere and gave his reasons for this line of thought. —**Reported by H. Richard Tillman for the Carolinas Chapter.**

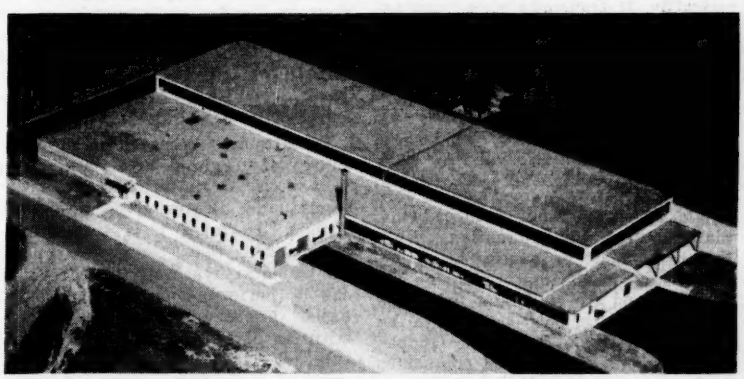
Tulsa Hears Electron Microscope Talk

Ray McBrian, Engineer of Standards and Research, Denver & Rio Grande Western Railroad, Spoke on "Use of the Electron Microscope in the Study of Fuels and Lubricants in Conjunction With Internal Combustion Engines" at a Meeting Held by the Tulsa Chapter. Shown are, from left: Paul Ogden, vice-chairman; Mr. McBrian; George Sykora, chairman; and Homer Garrison. (Photo by R. E. Miller, Secretary-Treasurer, Tulsa Chapter)

Columbus Officers Initiate New Season

Officers of the Columbus Chapter for the 1954-55 Season Include, From Left: R. E. Christin, Electric Heat Treating Co., Secretary; J. Harry Jackson, Battelle Memorial Institute, Vice-Chairman; Arthur Westerman, Battelle Memorial Institute, Retiring Chairman; Franklin H. Beck, Ohio State University, Newly Elected Chairman; and P. Maynard, North American Aviation, Inc., Treasurer. (Photograph from R. E. Christin for Columbus)

Moves Into New Electric Furnace Plant



As Part of Its 50th Anniversary Year, C. I. Hayes Inc., the Country's Oldest Electric Heat Treating Furnace Manufacturer, Has Recently Moved Into a New Modern Plant in Cranston, R. I. The factory is twice as big as Hayes' Providence plant and has four times the productive capacity

Gives History of Nondestructive Testing

G. B. Baumeister (Left), Special Products Department, Magnaflux Corp., Who Spoke on "New Horizons in Nondestructive Testing" Before a Meeting of the Texas Chapter, Is Shown With Bob Oakley, Chairman of the Chapter

Speaker: G. B. Baumeister

Magnaflux Corp.

G. B. Baumeister, engineer, special products department, Magnaflux Corp., spoke on "'New Horizons in Nondestructive Testing" at a meeting of the Texas Chapter.

Mr. Baumeister stated that electronic devices are being used more and more every day to replace the old-time inspector. Although these devices are not subject to such human failings as fatigue, emotional stability, etc., they must be used with some caution, as the results obtained can be misleading if they are not interpreted correctly.

Mr. Baumeister displayed some of the instruments made by his company and described their functions. The first, a "Sonizon", is an ultrasonic instrument that can be used to measure the thickness of various type materials. It transmits high-frequency sound waves through the material being checked and the thickness is determined by the position of the "pip" on the cathode ray tube. It is also used in determining such defects as laminations.

Mr. Baumeister next described a seam-depth indicator called the "Sedac", which was developed by Republic Steel Co. and is now being manufactured by Magnaflux. With this instrument it is possible to detect seams in the material being inspected and to indicate only the seams that are deep enough to be harmful. With the increasing emphasis being put on the steel companies to furnish materials that do not have seams greater than a specified depth, the "Sedac" can be very useful.

The "Magnatest" sheet thickness meter, which was invented by a German scientist and is being manufactured in the Western Zone of Germany, was described next. It is a portable instrument used to determine thicknesses of magnetic materials. It does not require an outside power supply as power is generated by the contact of an Alnico magnet with the steel. Its range at present is only 0 to 0.050 in.; however, an instrument capable of measuring up to about 0.500 in. is now under development.

Mr. Baumeister next described an electrical conductivity meter, an instrument being used quite extensively in the nonferrous field to replace the old Wheatstone bridge method, which was quite slow and cumbersome. The hardness of a metal is determined from the differences in electrical conductivity.

A number of interesting slides were used to illustrate Mr. Baumeister's talk.—**Reported by Joe B. Marx for the Texas Chapter.**

Unclassified Research on Uranium Urged by AEC

To date, most research on the metallurgy of uranium and its alloys has been done at major A.E.C. laboratories under the usual security conditions. However, it is not generally realized that there are many fundamental research projects that can be performed on an unclassified basis. For example, studies of constitution diagrams and crystal structure, electronics structure, mechanisms of corrosion, thermodynamics, phase transformations, electrochemical studies and other basic research on uranium and its alloys can be performed as unclassified research.

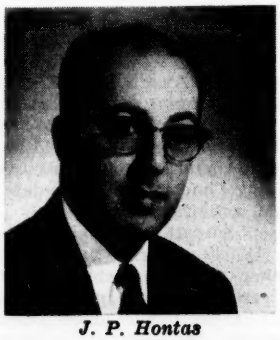
Work may be carried out under these general principles: First, any subject for research must have the approval of the A.E.C.'s Office of Classification, and a license must be obtained for purchase of natural uranium if more than 3 lb. are to be used. The metal is unclassified, however, and need only be accounted for on the basis of its monetary value. Second, a project leader must generally be given a security clearance so that he may learn what information might be classified and be able to recognize and secure classified information should it unexpectedly be developed. Third, technical reports, although nominally unclassified, must be reviewed by A.E.C. before publication. Experience to date indicates that delays or deletions as a result of such review are exceedingly rare, however.

University research groups are urged to study in these fields and the A.E.C. has indicated willingness to provide financial support, as funds are available, to worthy research projects, or to provide necessary small amounts of natural uranium free of charge in return for information developed. Further inquiry should be made to the A.E.C.'s Division of Research, Washington 25, D. C.

Joins A.S.M. Staff

James P. Hontas has accepted an appointment as A.S.M. headquarters staff metallurgist. He will assist technical committees working on the next edition of the ***Metals Handbook***.

Mr. Hontas was graduated as a metallurgical engineer from the



J. P. Hontas

Colorado School of Mines and holds a degree in business administration from Fenn College. After graduation from Colorado in 1942, Mr. Hontas was employed by Goodyear Aircraft Corp. for 3½ years and for the next five years was research and development metallurgist for Cleveland Graphite Bronze Co. Since 1951 he has been a materials engineer with Clark Controller Co.

Mr. Hontas' diversified experience in the metalworking industry will be of specific value in his work with A.S.M. technical committees preparing reports for the forthcoming edition of the ***Metals Handbook***.

Traces Man's Development Through Tools

Speaker: C. G. Schelly
Wilkie Foundation

"Civilization Through Tools" was the title of the talk presented at the first meting of the **Milwaukee Chapter** this season. C. G. Schelly, managing director of the Wilkie Foundation, discussed the significance of the tools contained in the documentary exhibit "Civilization Through Tools" —a study of the evolution of tools during the past million years. The exhibit is the first attempt made to assemble the complete history of man's tools and is important because the history of man and the development of his tools are synonymous.

With the aid of the authentic tools on display, Mr. Schelly traced the advancement of man, mentally and physically, from the Stone Age, a million years ago, where energy was supplied by muscle power, through the advent of the age of metals and the industrial revolution.

Throughout the talk, the effect of tool developments on man's economic and material welfare was emphasized. An examination of American society and its economics in relation to tools at the present time culminated the presentation.

C. G. Schelly, Managing Director, Wilkie Foundation, Des Plaines, Ill. Spoke on "Civilization Through Tools" at a Meeting in Milwaukee

Prof. Kurt Wendt, dean of the college of engineering, University of Wisconsin, and former faculty representative on the athletic committee of the Western Conference, presented a short coffee talk on "Big Ten Football'.—**Reported by E. H. Schmidt for Milwaukee.**

Australian Titanium Picture Given at Ottawa

Speaker: W. H. Worner
Commonwealth of Australia

Australia is not now producing titanium commercially, although it has an abundant and readily accessible supply of titanium oxide (rutile), quantities of which are being shipped to the U. S. Australian scientists are, however, keenly interested and actively engaged in metallurgical research on titanium, according to W. H. Worner, principal research officer, Commonwealth Scientific and Industrial Research Organization, Melbourne, who gave a talk on "Titanium—the New Metal" before the **Ottawa Valley Chapter.**

Dr. Worner introduced his subject with a short history of titanium and pointed out some of the factors which have retarded its development. He discussed the major problems confronting the metallurgist in the extraction and melting of titanium, and outlined the methods being employed to overcome these difficulties.

With reference to the fabrication of titanium, the speaker mentioned that large ingots may be treated similarly to alloy steel in such operations as rolling, drawing and forging, providing careful attention is given to temperatures and lubrication. The metal may be machined, ground and, with the adoption of correct techniques, it may be welded and brazed.

Dr. Worner pointed out that titanium is presently being alloyed with a number of metals and he discussed the applications of these alloys in the medium temperature range, showing why certain alloys, particularly those containing aluminum and tin, may prove better in this application. Titanium is very expensive and hence, at present, its chief application is in the aircraft industry where its combination of high strength and lightness are important considerations. However, since its resistance to corrosion is comparable to austenitic stainless steel, it is also being used to a limited extent in the chemical and engineering and medical fields.—**Reported by P. J. Todkill for Ottawa Valley Chapter.**

Science Achievement Program Open for 1954

Continued financial support from the American Society for Metals enables the Science Achievement Awards for Students program to be continued by the National Science Teachers Association in 1955. More than 100 science students in grades 7 through 12 will be awarded cash prizes, gold pins and certificates in recognition of quality performance in science activities. Plaques will be awarded to schools represented by student winners.

The awards program was developed by N.S.T.A. in consultation with classroom teachers, high-school principals and administrators. All awards are based on student reports of experimental and investigational work in science or mathematics. Awards are divided equally among eight regions of the country so that students are not competing with the "whole world" but only with fellow students in their own regions. Students in public, private and parochial schools are eligible to enter.

The purposes of the Science Achievement Awards program are: to encourage laboratory and experimental work in science; to help develop early and lasting interest in science; to assist older students in thinking about careers in fields of science and engineering; and, in general, to aid teachers in achieving the commonly accepted goals of science instruction for all students.

Reports of projects entered in the Science Achievement Awards program leave little doubt that our science teachers are keeping alive America's vigorous spirit of scientific inquiry and investigation. Students leave few stones unturned in their quest for topics to study or problems to solve. It is true that the ambitions reflected by some of the titles would cow a sophisticated scientist; nevertheless, many projects successfully shed at least a ray of light on significant problems.

Additional information about the program can be obtained from: Future Scientists of America Foundation, N.S.T.A., 1201 Sixteenth St., N. W., Washington 6, D. C.

Flame Hardening Talk Presented at Montreal

Speaker: A. C. Harris
Cincinnati Milling & Grinding Machines

The **Montreal Chapter** heard A. C. Harris, flamatic sales manager of the Process Machinery Division, Cincinnati Milling & Grinding Machines Inc., speak on "Flame Hardening" at a recent meeting.

Mr. Harris emphasized the selective nature of the flame hardening process and stressed its economy on plain carbon steels and cast iron. He reviewed the different types of gas mixtures and the relative merits of the oxy-acetylene, oxy-propane and oxy-natural gas systems.

Mr. Harris also spoke of the use of quenching in conjunction with flame hardening and showed slides of individual set-ups involving quenching. He illustrated the types of machines available for the four methods of flame hardening—stationary, progressive, spinning and combination or progressive-spin method. —**Reported by Rafe Sherwin for Montreal Chapter.**

CHAPTER MEETING CALENDAR

CHAPTER	DATE	PLACE	SPEAKER	SUBJECT
Birmingham	Dec. 7	Hoopers Cafe	Clarence Jackson	Welding and Metallurgy Work Together
Calumet	Dec. 14	Phil Smidt's	Leon C. Bibber	Low-Alloy High-Strength Carilloy T-1
Cedar Rapids	Dec. 14	Hotel Roosevelt	T. R. Lichenwalter	Story of Stainless Steels—Christmas Party
Chattanooga	Dec. 21	Maypole Restaurant	Tom W. Curry	Recent Developments in Gray Iron Castings
Chicago	Dec. 13	Furniture Club		Christmas Party
Cincinnati	Dec. 9	Engineering Society Headquarters	W. A. Pennington	Decarburization of Steel
Dayton	Dec. 8	Morris Bean Foundry	Morris Bean	Precision Casting
Detroit	Dec. 6	Elmwood Casino		Christmas Stag Party
Eastern New York	Dec. 14	Edison Club		Christmas Party
Indianapolis	Dec. 13	McClarney's Restaurant		Allison Powerama
Jacksonville	Dec. 13	Seminole Hotel	Otto Zmeskal	Progress in Toolsteel Alloy Development
Mahoning Valley	Dec. 7	V. F. W.	G. A. Roberts	Powder Metallurgy of Alloy Steel
Manitoba	Dec. 9	Marlborough Hotel		Stag Night
Montreal	Dec. 6	Queen's Hotel	L. J. Oye	You Can Inspect Quality Into a Product
Muncie	Dec. 14	Muncie, Ind.	Lee Busch	Metallurgy of Titanium
New Jersey	Dec. 13	Essex House		Annual Smoker
New York	Dec. 6	Schwartz's Restaurant	A. W. Deller	What You Should Know About Patents
North Texas	Dec. 2	Hilton Hotel	C. A. Muller	
Notre Dame	Dec. 8	Engineering Bldg.	J. D. Dale	Powder Metallurgy in Ordnance
Oak Ridge	Dec. 8	K. of C. Hall	Gregory Comstock	Powder Metallurgy and New Developments in That Field
Ottawa Valley	Dec. 7	P.M.R.L.	G. D. Young	Modernization of Canadian Steel Mill Practice
Peoria	Dec. 13	New Legion Hall	Eric Welander	Manufacturing Methods and Metallurgy of Pearlitic Malleable Iron
Philadelphia	Dec. 3	Penn-Sheraton Hotel		Christmas Party
Jr. Section	Dec. 3	Penn-Sheraton Hotel		Christmas Party
Pittsburgh	Dec. 3	Vogue Terrace		Christmas Party
Purdue	Dec. 21	Purdue Memorial Union	J. C. Fisher	Transformation Kinetics
Rhode Island	Dec. 1	Johnson's	Carl F. Floe and Panel	What Material Shall I Use?
Rochester	Dec. 13	Howard Johnson's	J. Y. Riedel	Causes of Tool Failures
Rocky Mt. Denver	Dec. 17	Oxford Hotel	G. W. Wensch	Atomic Energy
Rome	Dec. 8	Elks Club	Norman Mochel	High-Temperature Materials for Atomic Boilers
St. Louis	Dec. 10	Sheraton Hotel		Dinner - Dance
Texas	Dec. 7		P. R. Wray	High Strength Low Alloy Steels
Tri-City	Dec. 7	Rock Island Arsenal	A. E. Nehrenberg	Hardenability of Steel
Washington	Dec. 13	Naylor's Restaurant	L. C. Bibber	Fabrication of Carilloy T-1 Steel
Western Ontario	Dec. 10	Cobblestone Inn	Panel	Stump the Experts Night
Wichita	Dec. 10	K. of C. Hall		Christmas Party
Worcester	Dec. 8	Hickory House	R. P. Selig	Recent Developments in Powdered Metals
York	Dec. 8	Lancaster		

25th Anniversary Celebrated by New Jersey

Present at New Jersey's Silver Anniversary Meeting in September Were, Seated, From Left: H. F. J. Skarbek, Secretary; W. H. Eisenman, National Secretary; R. W. Thorne, Treasurer; J. B. Austin, National President; G. A. Roberts, National Vice-President; G. Davenport; W. A. Pennington, National Treasurer; and A. O. Schaefer, A.S.M. Trustee. Standing, from left: Frank Foley, past national president; R. J. Raudebaugh, national trustee; R. A. Grange, vice-chairman; H. D. McKinney, past chairman; J. A. Kearney, chairman; J. H. White, past chairman; and James Gill, past national president. (Photo by E. Baureis)

A.S.M. national officers joined with 330 members and guests in September to celebrate the **New Jersey Chapter's** 25th anniversary of its organization. The Silver Jubilee Dinner Meeting was presided over by H. D. McKinney, Driver Harris Co., first vice-chairman of the Chapter, who reviewed the progress of the Chapter by a brief tribute to each chairman, with special mention of W. R. Bennet, first chairman and one of the founders.

A.S.M. vice-president, George A. Roberts, gave the principal address of the evening on the subject "A.S.M. for Industrial Progress". He related various activities of the Society to the community and its industries and stressed the need for continued and increased effort toward the objectives of the Society.

A.S.M. President J. B. Austin congratulated the Chapter on its record and presented certificates to 25-year members.

National Secretary William H. Eisenman recalled the meeting he and Zay Jeffries, first A.S.M. president, attended 25 years ago with the Chapter's founding members, which marked the start of the Society's activities in New Jersey. He paid tribute to the various officers who, through the years, have contributed to the New Jersey Chapter's record. Since the original charter had been lost, Mr. Eisenman presented a new charter to the Chapter.

The following sustaining and regular members who observed their 25th year of membership in the Society were presented with silver anniversary certificates: Ackerlind Steel Co., Inc., American Gas Furnace Co., Alexander Bourgeois, Herbert F. Brown, Roger S. Brown, David A. Butler, Carborundum Co., Henry J. Chapin, Granger Davenport, I. Erdman, Faitoute Iron & Steel Co., J. Edward Fitzsimons, William H. Hall, Aage C. C. Hansen, Hyatt Bearings Division, G.M.C., E. D. King, Latrobe Steel Co., John C. Lewis, Jr., Thomas C. Malcolm, George McAusland, N. Padowicz, Louis Pickett, Public Service Electric & Gas Co., Rolf G. Sartorious, and Weston Electrical Instrument Corp.—**Reported by Mel Young for New Jersey.**

25-Year Treasurer

The Founding Treasurer of the New Jersey Chapter, R. W. Thorne, Who Has Served Continuously in That Capacity for the Past 25 Years, Was Feted at the Chapter's Silver Jubilee Celebration in September. Mr. Thorne, who is retiring from consulting practice, was presented with a 3-D camera in appreciation of his long service

Heat Treating Principles Theme of Oregon Meeting

Speaker: Peter Payson

Crucible Steel Co. of America

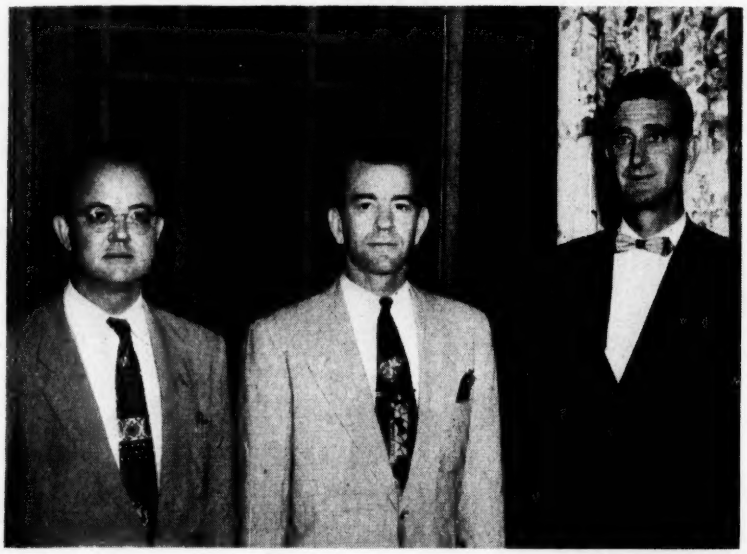
Peter Payson, assistant director of research, Crucible Steel Co. of America, spoke on "Fundamental Principles of Heat Treatment" at a meeting of the **Oregon Chapter.**

Using three different steels, 18-4-1 high speed, AISI 4640, and a high carbon toolsteel for examples, Mr. Payson described what happens to the structure of steels during heating and cooling. He discussed the changes that occur during heating, emphasizing the formation of austenite, solution of carbide and grain coarsening.

Changes taking place during cooling were shown in relation to the TTT-curves for each of the three steels. How to arrive at the best structure for machinability was explained and illustrated with slides.

Mr. Payson concluded by showing how steels are toughened by tempering and their resulting mechanical properties.—**Reported by James P. Bates for Oregon Chapter.**

Welding Ships Subject at New Orleans



Robert Macey (Left) Technical Assistant, Ingalls Shipbuilding Corp., Gave a Talk on "Recent Applications of Welding in Shipbuilding" Before a Meeting of the New Orleans Chapter. He discussed the use of proper sequence welding to decrease residual stresses in heavy weldments and ships, and how investigation of stresses induced by various welding techniques has been made by attaching strain gages to weldment sections. He is shown with Perry Jones (center), Chapter chairman, and Thomas Dawson, chief metallurgist at Ingalls. (Reported by F. Ransom for New Orleans)

Explains Function of F.B.I. at Fort Wayne

Speaker: Leonard Blaylock
Federal Bureau of Investigation

At a meeting of the **Fort Wayne Chapter,** Leonard Blaylock, special agent in charge of the Indianapolis Division of the Federal Bureau of Investigation, presented a talk on "Security in Industry".

The F.B.I. acts under presidential directive as the coordinating agency on matters affecting the internal security of the United States and its territories. While the various intelligence services of the armed forces are responsible for military matters, the F.B.I. has the responsibility of civilian security matters. It operates as a purely fact-finding agency and furnishes pertinent information to appropriate government officials but makes no attempt to evaluate this information.

Citizens can assist the F.B.I. in discharging its responsibilities in the security field by reporting all matters related to espionage, sabotage and subversive activity to the F.B.I. Citizens should make no attempt to evaluate their information, but should be alert to furnish facts. Idle rumors or gossip are of no interest.

F.B.I. agents are greatly assisted by scientific examinations of evidence by the F.B.I. Laboratory in Washington, D. C., where a staff of scientists and technicians conducts any type of scientific examination that might be requested by agents or other law enforcement agencies. **—Reported by Lee Van Fossen for Fort Wayne.**

Compliments

To WILLIAM JUSTIN KROLL, Corvallis, Ore., on being awarded the Francis J. Clamer Medal by the Franklin Institute of the State of Pennsylvania, for his invention of a method adaptable to the large scale production of cold malleable commercially pure titanium and zirconium.

♦ ♦ ♦

To SAM TOUR, president of Sam Tour & Co., Inc., on being awarded the A.S.T.M. Award of Merit "for long and fruitful service extending over many technical fields and administrative phases, for work on test methods, and especially for contributions to the metals and corrosion fields".

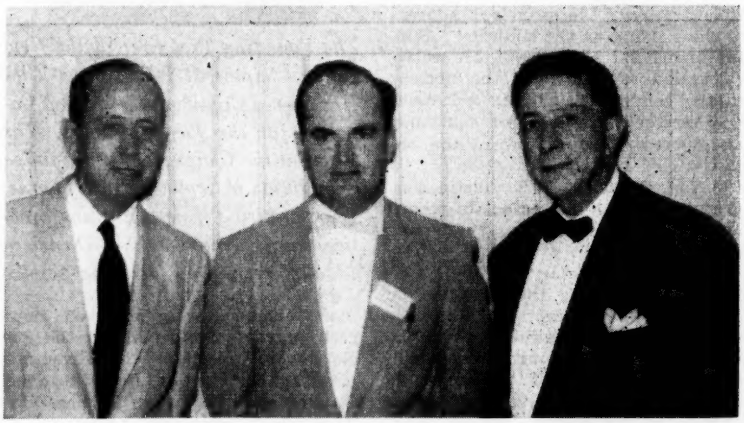
♦ ♦ ♦

To ERNEST E. CHARLTON, consultant in nucleonics and radiation at the General Electric Research Laboratory, Schenectady, on being chosen as the Mehl Honor Lecturer at the Annual Convention of the Society for Nondestructive Testing.

♦ ♦ ♦

To G. V. LUERSSEN who has retired as vice-president in charge of metallurgy at Carpenter Steel Co., after continuous service with the company since 1907, with the exception of the four years spent at Pennsylvania State College and his service in World War I. He received the first Bradley Stoughton Award of the Lehigh Valley Chapter in 1945, and in 1949 was awarded the David M. McFarland Award for outstanding accomplishments in the field of metallurgical research. Mr. Luerssen is a past-chairman of the Lehigh Valley Chapter A.S.M.

Join Forces at Worcester's Smorgasbord



Speakers at the Worcester Chapter's Annual Smorgasbord Were, From Left: Frederick E. Maguire, Boston Red Sox Scout, Who Spoke on "Baseball"; Irving J. Donahue, Jr., Technical Chairman; and A. Alfred Marcello, City Editor, Worcester Telegram, *Who Gave a Talk Entitled "Behind the Newspaper". (Photograph by C. Weston Russell for the Worcester Chapter)*

Gives Metallurgical Aspects of Nuclear Reactors at Utah

Speaker: M. Bartz

Phillips Petroleum Co.

M. Bartz, Atomic Energy Division, Phillips Petroleum Co., presented a talk on "Metallurgical Aspects of the Atomic Energy Program" at a meeting in Utah.

Mr. Bartz stated that, in addition to the usual requirements that metals possess good corrosion resistance, adequate load carrying ability and strength at operating temperatures, metals that are to perform satisfactorily in nuclear reactors must have two properties that have been of no interest to metallurgists designing conventional power equipment. First, structural materials must not capture or absorb neutrons to an extent that fuel utilization is inefficient, or worse, to an extent that a neutron reaction cannot be maintained. Second, the changes occurring in metals, as neutrons pass through them, must not be great enough to cause the material to fail to perform as intended.

Beryllium, magnesium, zirconium, aluminum, columbium, iron, molybdenum, chromium, stainless steels, nickel-base alloys and titanium are, in decreasing order of desirability, the metals that are attractive because their tendencies to absorb neutrons are not as great as the tendencies of other metals to absorb neutrons. Alloying elements commonly used in steel, such as manganese and boron, have prohibitively high neutron absorption characteristics. For the same reason, high-temperautre alloys containing cobalt or tungsten are less desirable than alloys without these elements. Silver, hafnium, cadmium and the rare earths are to be avoided as alloying elements in nonferrous metals and stainless steels.

Changes in mechanical properties that take place in metals during neutron bombardment were initially thought to be similar to changes brought about when metals are cold worked. The effects differ from cold work in two respects: They are of submiscroscopic or extremely localized in scale; and the effects are nondirectional. Recent investigations explain the mechanisms of radiation damage as being more analogous to solid solution hardening. Whatever the interpretation, the fact remains that changes of engineering importance take place during neutron irradiation. Generally, hardness, yield strength and ultimate strength of a metal increases while ductility decreases. Notch impact resistance decreases and, in the case of carbon steels and molybdenum, ductile-to-brittle transition temperatures are raised. Radiation induced phase transformations in austenitic stainless steels result in increased ferromagnetism. Changes in density and electrical resistivity have been observed.

To assist in evaluating the effects of radiation on reactor materials, the materials testing reactor was constructed at the National Reactor Testing Station in Idaho. This reactor, operated by Phillips Petroleum Co. for the A.E.C., provides experimenters with an extremely intense source of neutrons. Metals of interest are placed in the reactor for the desired length of time, removed and tested. As metals removed from the reactor are radioactive, handling must be done remotely. Safe handling and testing of radioactive materials are accomplished at the materials testing reactor in a facility known as a "hot cell". In this facility materials are handled, examined and tested with 4-ft. thick walls of dense concrete between the experimenter and the radioactive materials under test. Viewing is through windows having thickness and shielding effectiveness equal to the concrete walls of the cell. Testing machines placed inside the cell are manipulated with mechanical arms that, inside the cell, duplicate the motions of human arms and hands. Although time consuming, the usual tests of mechanical and physical properties can be performed on radioactive materials without loss of accuracy in testing results—**Reported by R. O. Kron for Utah.**

Fatigue Testing Lab

A laboratory specializing in fatigue testing materials and repeated loading of parts and components has been opened by the Krouse Western Laboratories, Inc., Van Nuys, Calif. The laboratory is equipped with a complete line of modern fatigue testing equipment and is expected to service industry and government agencies in all western states.

Holds Annual Clambake

Lehigh Valley Chapter was host to 105 members and guests at its annual stag party, held this year at the Beethoven Waldheim in Leithsville. A day of outdoor and indoor sports was climaxed by a huge clambake and entertainment.—**Reported by D. F. Williams for Lehigh Valley.**

Student Awarded A.S.M. Scholarship

Kenneth E. Rose (Left), Chairman of the Kansas City Chapter, Is Shown as He Presents a Check to Robert Wayne Reck of Hutchinson, Kan., at a Meeting of the Chapter. Mr. Reck is the winner of the A.S.M. undergraduate scholarship in metallurgy at the University of Kansas for 1954-55

Metallurgical News and Developments

Devoted to News in the Metals Field of Special Interest to Students and Others

A Department of *Metals Review*, published by the
American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio

Releases Copper—The Office of Defense Mobilization has directed the Department of Commerce to release 26,500 tons of copper from Government stocks to ease shortages resulting from recent strikes. This help is limited to firms facing shutdowns because of lack of the metal.

Giant Press—An 8000-ton forging press, three stories high, is included in an expansion program at Harvey Aluminum's Torrance (Calif.) plant. By 1955 the company's forging operation will be the largest in the western U. S.

Heat Treatable Titanium—Battelle Memorial Institute has developed a new titanium alloy capable of being heat treated to very high strengths. Heat treatments used on the new alloy are reported to eliminate brittleness and produce a metal with a strength of over 200,000 psi.

Welding Electrode—National Cylinder Gas Co. has announced a new all-purpose electrode for welding mild steel. The new electrode is easy to handle in all positions over a wide current range, forms a slag that is exceptionally easy to remove, and gives a high rate of deposit with little spatter, resulting in beads of uniform appearance and even ripple, flat to slightly convex in profile.

Conductors—A higher strength aluminum alloy for electrical bus conductors has been announced by Kaiser Aluminum & Chemical Sales, Inc. The new alloy provides a bus conductor alloy combining high-strength characteristics and conductivity, and is expected to replace other electrical conductor alloys in many present bus applications.

New Thermocouple—A new type of thermocouple with rugged construction and extremely fast response for use in measuring rapid temperature changes of metal wall surfaces has been announced by the Engineering Division of the Midwest Research Institute. The instrument can be used for recording temperatures in gun bores, cylinder and piston walls, brake drums, aircraft skins, autoclave walls and air ducts.

Uranium Plant — A.E.C. has announced a $33.3-million uranium feed materials plant for Mallinckrodt Chemical Works near St. Louis. Mallinckrodt's existing plant in St. Louis for refining uranium will be expanded at a cost of $6.5 million.

M.I.T. Lab—Peacetime applications of electronic and nuclear science will be studied in a new laboratory to be built at M.I.T.

Atomic Engine—An atomic airplane engine is the goal of a new research lab to be set up by the Air Force in East Hartford, Conn., in collaboration with the Pratt & Whitney Division of United Aircraft Corp.

Derusting Compound—Enthone, Inc., has developed a new nonelectrolytic alkaline derusting compound, comprised of free-flowing powder used in concentration with water. When a solution of the salts is heated from 180° F. to the boiling point, rapid removal of rust is accomplished.

Bart Expands—Purchase of the complete production facilities of the Detroit Die Casting and Plating Co., and installation of expanded facilities for gold plating die castings, have been reported by the Bart Mfg. Co. of New Jersey.

Chatterless Shanks—Boring bars and lathe tool shanks of a new metal alloy which greatly reduces tool "chatter" have been introduced by P. R. Mallory & Co., Inc. These shanks can be used with all standard cutting tips. They reduce chatter by as much as 50%, permit deeper cuts and result in smoother surfaces which often require no finish grinding.

TO A.S.M. Members: Many of you are looking forward with pleasure to more details about the Technical Societies Congress in Europe from June 1-19, 1955. If you wish to be immediately informed on additional plans as they develop for the technical program and the planned visits, then send your name to A.S.M. headquarters and request to be placed on the mailing list to receive information about "A.S.M. to Europe in '55".

Invite Applications—University faculty members are invited to apply for places in the Oak Ridge Research Participation Program carried out by Oak Ridge National Laboratory and the Oak Ridge Institute of Nuclear Studies. The Laboratory offers opportunities for fundamental and applied research in metallurgy, physics and other sciences, with a number of nuclear reactors and particle accelerators as the principal research instruments. Write for applications to: University Relations Division, Oak Ridge Institute of Nuclear Studies, P. O. Box 117, Oak Ridge, Tenn.

Converting Taconite—A new process for heat hardening of pellets made from taconite iron ore concentrates has been announced by the Arthur G. McKee & Co. and Allis-Chalmers Mfg. Co. Major advantages of process include: Extreme simplicity of operation; utilization of heat recovered from the operation; ease of quality control resulting from the ability of the operator to see what is going on during the process; direct and simple discharge of product from equipment; and minimizing of breakage of pellets.

Wire Film—A method of coating rectangular wire with film insulation developed by General Electric's Distribution Transformer Dept., has made possible an increase in transformer reliability and reduction in transformer sizes and weights. By a novel method, an insulation wire film can be applied to rectangular-shaped copper conductor. The insulation is spread evenly on the edges as well as on flat surfaces, has remarkable mechanical as well as electrical strength, and it will adhere to copper conductors.

Co-Op Venture—Aluminum Co. of America's Research Laboratory has appointed a team of experts to study porcelain enamel on aluminum. The group will deal with the fundamental research and the practical and economic problems connected with this specialized field.

A. S. M. Review of Current Metal Literature

An Annotated Survey of Engineering, Scientific and Industrial Journals and Books Here and Abroad Received During the Past Month

Prepared by the Technical Information Division of Battelle Memorial Institute, Columbus, Ohio

A General Metallurgical

243-A. Dangerous Materials in Welding. *Australasian Engineer,* 1954, July, p. 89, 91-92, 95.

Toxicology of fumes of cadmium and zinc oxide, lead, fluorides, carbon monoxide, oxides of nitrogen and nitrous gases. (A7, K general)

244-A. "Seraphim" Extensions at Scunthorpe. *Engineer,* v. 198, Aug. 13, 1954, p. 236-238.

Improvements in plant facilities of the Appleby-Frodingham iron works. Photographs, table. (A5, Fe)

245-A. Metal Cans of the Future. K. W. Brighton, R. W. Pilcher and R. H. Lueck. *Food Technology,* v. 8, Sept. 1954, p. 424-430.

World politico-economies and tin resources. Alternate methods of food enclosure. Map, photographs, tables. 13 ref. (A4, T10, Sn)

246-A. Cooling Hot Spots in Industry. Alfred B. Wason. *Heating and Ventilating,* v. 51, Sept. 1954, p. 88-94.

Analysis of heat-producing operations. Ventilation and other corrective measures. Graph, tables, diagrams. (A5, A7)

247-A. Stampings—Should You Make Them or Buy Them? C. C. Caditz. *Iron Age,* v. 174, Sept. 23, 1954, p. 107-111.

Economics of specialized production. Drawings. (A4, G3)

248-A. Import Ore Handling—Machines and Practices. Erle M. Hays. *Iron and Steel Engineer,* v. 31, Aug. 1954, p. 84-90; disc., p. 90-94.

Problems involved in unloading iron ore when standard ocean-going cargo boats are used. Photographs, diagrams. (A5, B10, Fe)

249-A. Metallurgical Aspects of Plant Maintenances. T. G. Bradbury. *Iron and Steel Engineer,* v. 31, Sept. 1954, p. 90-97.

Importance of good understanding of properties and characteristics of materials in equipment maintenance. Micrographs, graphs, tables, photographs. (A5)

250-A. Air Pollution Control in the Bethlehem Steel Company. Allen D. Brandt. *Iron and Steel Engineer,* v. 31, Aug. 1954, p. 103-106; disc., p. 106-107.

Control program for one particular plant. Photograph. 2 ref. (A7, D general)

251-A. Japanese Steel Stages Comeback. Stephen Badlam. *Iron and Steel Engineer,* v. 31, Aug. 1954, p. 161-162, 165-166.

Plants, equipment and procedures responsible for present day scale of operation. Photographs, tables, diagram. (A general, ST)

252-A. New Method for Handling Steel Tube. P. I. Craddock. *Mechanical Handling,* v. 41, Sept. 1954, p. 516-520.

Operations and advantages of method in unloading, storage and movement of steel tube over 30 in. in length. Photographs, tables, diagrams. (A5, ST)

253-A. Work Study and the Materials Handling Engineer. C. G. Chantrill. *Mechanical Handling,* v. 41, Sept. 1954, p. 541-546.

Secret of materials handling, utilization of resources, effective production, development of work study and its measurement and application to materials handling and flow of materials. (To be continued.) Diagrams. (A5)

254-A. Metallurgy in the Days of Alchemy. Carl Andrew Zapffe. *Metal Progress,* v. 66, Sept. 1954, p. 89-95.

Development of alchemy and its subsequent evolution into modern science. Tables. (A2)

255-A. Integrated Treatment for Metal-Finishing Wastes. L. E. Lancy. *Sewage and Industrial Wastes,* v. 26, Sept. 1954, p. 1117-1125.

Evaluation and treatment of wastes. Examples. Flow sheets, table, graphs. 20 ref. (A8, L general)

256-A. Disposal of Electroplating Wastes by Oneida, Ltd. V. Plant Operation. Paul W. Eichenlaub and James Cox. *Sewage and Industrial Wastes,* v. 26, Sept. 1954, p. 1130-1135.

Silver recovery and processing of cyanide wastes. Tables. 3 ref. (A8, L17, Ag)

257-A. Research in the United States. (Digest of "Research—One of the Factors in the Industrial Success of the United States", by Georges Delbart; *Fonderie,* Jan. 1954, p. 3745-3754.) *Metal Progress,* v. 66, Sept. 1954, p. 194, 196, 198.

American research organizations described and compared with European equivalents. (A9)

258-A. Product Diversification. *Steel,* v. 135, Sept. 13, 1954, p. 112-120.

New products replace "losers", find work for idle facilities, balance out cycles, provide outlets for proprietary items and insure growth. All lead to greater profit. Photograph. (A4)

The coding symbols at the end of the abstracts refer to the ASM-SLA Metallurgical Literature Classification. For details write to the American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio.

259-A. Steel Industry Statistics. *Steel,* v. 135, Sept. 20, 1954, p. 112-126.

Report on expanded steel capacity in U. S. and Canada. Tables. (A4, ST)

260-A. Stampings From Scrap. Ernest J. Urbas. *Tooling and Production,* v. 20, Sept. 1954, p. 62-63.

Possibilities for salvage of areas of metal that usually finish as strip or slug scrap by making additional stampings from the scrap areas. Photographs. (A8, G3)

261-A. The Interactions of Applied Science and Technology for the Civilian Economy and for National Security. Mervin J. Kelly. Paper from "Yearbook of the American Iron and Steel Institute". p. 15-35.

Effects of industrial and technical developments on military and economic conditions. (A4)

262-A. (French.) **Possibility of Use of Gas Turbines in Heating Plants and in Industry.** A. Pineau. *Chaleur & Industrie,* v. 35, no. 349, Aug. 1954, p. 231-238.

Gas turbines in blast furnace and other installations, economic aspects, future prospects. Diagrams, photographs. (A4, A5, D1)

263-A. (German.) **Hazards in the Production and Processing of Aluminum.** W. Koetschau. *Aluminium,* v. 30, nos. 8-9, Aug.-Sept. 1954, p. 365-369.

Accident prevention and occupational diseases involved. (A7, Al)

264-A. (German.) **Design and Operation of a Central Materials Department.** Kurt Lehmann, Hans Scholten and Oskar Wagner. *Stahl und Eisen,* v. 74, no. 18, Aug. 26, 1954, p. 1113-1128; disc., p. 1128-1132.

Methods of controlling inventories and turnover of all materials used in metallurgical plants. Flow charts, specification blanks, diagrams. (A5)

265-A. Metallurgical Trends of Interest to Chemical Engineers. L. Rotherham. *Chemistry & Industry,* 1954, no. 38, Sept. 18, p. 1164-1170.

Developments in extractive and physical metallurgy of uranium, titanium, zirconium, tantalum, columbium and molybdenum. (A general, U, Ti, Zr, Ta, Cb, Mo)

266-A. (French.) **The End of the Neolithic Period and the Appearance of Metals.** A. A. Sanfourche. *Revue de métallurgie,* v. 51, no. 8, Aug. 1954, p. 517-523.

Data on corrosion of copper, bronze and iron applied to chronological boundaries assigned to different ages of civilization. Result is that the beginning of the "metal age" must be carried back beyond the time classically granted. Diagram. 18 ref. (A2, R general)

267-A. (Book.) **Metal Statistics 1954.** 47th Ed. 848 p. American Metal Market, 18 Cliff St., New York, N. Y. $3.00.

Statistical information on ferrous and nonferrous metals and various economic subjects. (A4)

B

Raw Materials and Ore Preparation

269-B. Brazilian Charcoal Blast Furnace Practices. Louis Ensch. *Blast Furnace and Steel Plant,* v. 42, Sept. 1954, p. 1053-1058.

Production of charcoal and blast furnace operation. Table, diagrams. (B18, D1, CI)

270-B. Extraction of Uranium From Aqueous Solution by Coal and Some Other Materials. George W. Moore. *Economic Geology,* v. 49, Sept.-Oct. 1954, p. 652-658.

Includes tables, graph. 16 ref. (B14, U)

271-B. Metallic Recuperators in the Steel Industry. E. A. Vierow. *Iron and Steel Engineer,* v. 31, Aug. 1954, p. 57-67; disc., p. 67-70.

Offer fuel economy and increased production. Diagrams, photographs. (B18, ST)

272-B. Sinter-Plant Operation at Appleby-Frodingham. N. D. Macdonald. *Iron and Steel Institute, Journal,* v. 178, Sept. 1954, p. 51-60.

Development of process and equipment. Operational problems. Future plans. Diagrams. (B16, Fe)

273-B. Report on Taconite. Charles Baroch. *Mines Magazine,* v. 44, Sept. 1954, p. 22-23, 33, 59.

Beneficiation procedures and plants. Flowsheet. 8 ref. (B14, Fe)

274-B. Beneficiation of Tungsten Ores. *Mines Magazine,* v. 44, Sept. 1954, p. 24-25, 43, 54.

Froth flotation procedures. Table. 31 ref. (B14, W)

275-B. Steel Industry Insures Its Future—With Taconite. *Steel,* v. 135, Sept. 13, 1954, p. 76-77.

Development and potentials of the Mesabi range, mining and processing. Photographs, diagrams. (B general, Fe)

276-B. Significance of Minor Elements in Iron Bearing Raw Materials for Integrated Steel Plants. C. B. Jacobs, J. F. Elliott and M. Tenenbaum. Paper from "Yearbook of the American Iron and Steel Institute". American Iron and Steel Institute, p. 123-149; disc., p. 150-152.

Occurrence, behavior and influence of minor elements occurring in ores and fuels. Tables, diagram, graphs. 10 ref. (B10, B18, ST)

277-B. (Polish.) Production of Hot Rolled Transformer Sheets of Low Watt Losses. M. Markuszewicz, J. Groyecki and A. Zawada. *Prace Instytutow Ministerstwa Hutnictwa,* v. 6, no. 3, 1954, p. 105-119 + 6 plates.

Use of calcium-silicon in place of about ⅓ the usual ferrosilicon produced the best electrical steel. Graphs, tables, micrographs. 40 ref. (B22, SG-q, AY)

278-B. (Russian.) Adhesion of Sulfide Minerals to Air Bubble in Absence of Reagents. I. N. Plaksin and S. V. Bessonov. *Doklady Akademii Nauk SSSR,* v. 97, no. 3, July 21, 1954, p. 495-498.

Change of time of adhesion of galenite and chalcopyrite under different conditions. Graphs. 9 ref. (B14, Pb, Cu, Fe)

279-B. Slag Treatment for Conservation of Chromium. T. W. Merrill and F. St. Vincent. *Electric Furnace Steel Proceedings,* v. 11, 1953, p. 69-73; disc., p. 73-77.

Procedures for recovery of chromium from steelmaking slags, significance and advantages of the repouring method. Tables, graphs. (B21, A8, Cr)

280-B. Substituted Starches in Amine Flotation of Iron Ore. C. S. Chang. *Mining Engineering,* v. 6; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 199, Sept. 1954, p. 922-924.

Replacement of active groups in corn starch, as shown by results of the starch derivatives tested, impairs rather than improves the value of cornstarch as a selective iron oxide depressant. Increased ability to depress iron oxides is generally accompanied by a parallel ability to depress quartz. Graphs. 3 ref. (B14, Fe)

281-B. Adsorption of a Mercaptan on Zinc Minerals. A. M. Gaudin and D. L. Harris. *Mining Engineering,* v. 6; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 199, Sept. 1954, p. 925-928.

Observations of the distribution of mercaptan containing S_{35} between aqueous solution and mineral and between aqueous solution and the gaseous phase. Graphs, tables. 5 ref. (B14, Zn)

282-B. Problem of Phase Composition of Some Lime-Chromium Slags With Special Consideration of the Characteristic Water-Solubility of Their Lime Component. D. S. Biliankin and V. V. Lapin. *Henry Brutcher, Altadena, Calif., Translation no.* 3305, 7 p. (From *Doklady Akademii Nauk SSSR,* v. 91, no. 4, 1953, p. 911-914.)

Previously abstracted from original. See item 26-B, 1954. (B21, Cr)

283-B. (French.) Progress in Studies Undertaken by the Ore Service of the IRSID and Reports of Some Tests Made Since the Last Meeting. *Centre de Documentation Sidérurgique, Circulaire d'Informations Techniques,* v. 11, no. 9, 1954, p. 1675-1678.

Iron ores, magnetic roasting, high-intensity magnetic separation and concentration by flotation. 3 ref. (B10, B15, B14, Fe)

284-B. (German.) Beneficiation of Magnetite Ore to a High Concentrate and Its Further Processing Into Sponge Iron in Persberg (Central Sweden). An Example of an Increasingly Important Process of Treating Swedish Iron Ores. Walter Lehnert. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 7, no. 9, Sept. 1954, p. 383-386.

Procedure of beneficating iron ore in a redesigned plant. Photographs, diagrams. (B14, D8, Fe)

C

Nonferrous Extraction and Refining

191-C. Continuous Casting—Progress in America. John S. Smart, Jr. *Australasian Engineer,* 1954, July, p. 57-71.

Reviews different processes. Photographs, diagrams, tables, micrograph. 41 ref. (C5, D9)

192-C. Double Melting Technique Improves Homogeneity and Purity of Zirconium and Titanium Ingots. G. L. Miller. *Iron Age,* v. 174, Sept. 23, 1954, p. 116-119.

Equipment, techniques and advantages of method for production of high-quality ingots. Diagrams, photographs, table. 4 ref. (C21, Ti, Zr)

193-C. (German.) Purification of Silicon by Gradual Melting Without a Crucible. S. Müller. *Zeitschrift für Naturforschung,* v. 9b, no. 7, July 1954, p. 504-505.

Zone melting procedure and results. Table. 7 ref. (C5, Si)

194-C. (Japanese.) Production of High Purity Calcium Metal. V. Observation on the Condensed Mass of Crystalline Metallic Calcium and Factors in the Distillation of Calcium Metal. VI. Refining of Impure Calcium Metal and Calcium Alloy Containing Volatile Metal by the Distillation Under a Reduced Pressure. Eiichi Fujita and Hiroji Yokomizo. **VII. A Design of Distillation Furnace and Heat Balance for Calcium Distillation Under a Reduced Pressure.** Eiichi Fujita. **VIII. Production of Calcium Metal by Thermal Reduction Method. IX. Vacuum Distillation of Calcium Metal.** Eiichi Fujita and Hiroji Yokomizo. **X. Evaluation of the Thermal Reduction and Vacuum Distillation Refining Process for Calcium Metal Manufacture.** Eiichi Fujita. *Government Chemical Industrial Research Institute, Tokyo, Reports,* v. 49, no. 6, June 1954, p. 209-236.

Includes photographs, diagrams, tables, graphs. 16 ref. (C22, C21, C25, Ca)

195-C. (Russian.) Peculiarities of Behavior of Zinc During Converting of Copper Mattes. A. I. Okunev and N. P. Diev. *Doklady Akademii Nauk SSSR,* v. 97, no. 3, July 21, 1954, p. 491-494.

Influence of zinc oxide, zinc sulfide and temperature on equilibrium pressure of zinc vapors. Graphs, table. 7 ref. (C21, Zn, Cu)

196-C. Developments in Copper Smelting. W. H. Dennis. *Mining Magazine,* v. 91, Sept. 1954, p. 142-149.

Reverberatory furnaces, wet charging techniques, flash and electrical smelting, converters and dust and sulfur dioxide recovery. Diagrams, tables. (C21, Cu)

197-C. The Place of Sodium in the New Metals Technology. Marshall Sittig. *Chemical Engineering Progress,* v. 50, Sept. 1954, p. 457-459.

Suggests sodium as reducing agent for metals such as titanium, zirconium, thorium, vanadium, columbium, tantalum, molybdenum and uranium. Descaling and finishing operations. Photograph, diagram, tables. 8 ref. (C4, L10, Na, Ti, Zn, Th, V, Cb, Ta, Mo, U)

198-C. (German.) Reaction Between Molten Zinc Sulfide and Zinc Oxide. Ernest Justus Kohlmeyer and Gerhard Goldschmidt. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 7, no. 9, Sept. 1954, p. 387-389.

Melting experiments with equal molecular mixtures of zinc sulfide and zinc oxide indicate reversible reaction expressed by the equation: $ZnS + 2\,ZnO = 3\,Zn + SO_2$. Diagram, graphs, photomicrographs. 8 ref. (C21, Zn)

199-C. (German.) Carbon Anodes for Aluminum Electrolysis. Werner Helling, Robert Lange and Günter Helmrich. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 7, no. 9, Sept. 1954, p. 389-394.

Relation between current yield and anode-carbon consumption to relative $CO:CO_2$ composition of the anode gas. Raw materials, binders and methods for producing carbon anodes. Tables, photographs, diagrams, graphs. 4 ref. (C23, Al)

D

Ferrous Reduction and Refining

381-D. Open-Hearth Versus Electric-Furnace Economics and Their Significance to the Power Industry. David D. Moore. *American Power Conference, Proceedings,* v. 16, 1954, p. 375-385.

Factors affecting relative costs of bath operations and importance of growth in production of electric furnace steels to the power industry. Tables, graphs. 6 ref. (D2, D5, A4)

382-D. Metallurgy and Practice of the Basic Converter Processes. A. Weyel and H. Kosmider. *Blast Furnace and Steel Plant,* v. 42, Sept. 1954, p. 1039-1047, 1065.

Principles and modern developments of basic bessemer process. Graphs, tables, diagrams. (To be continued.) (D3, CN)

383-D. Oxidation and Its Relationship to Steel Making. I. C. F. Christopher. *Blast Furnace and Steel Plant,* v. 42, Sept. 1954, p. 1059-1065.

Sources, role and control of oxygen in various stages of steelmaking. Table, graphs, diagrams. (To be continued.) (D general, ST)

384-D. Production Vacuum Melting —A Step Forward. Harry E. Trout. *Blast Furnace and Steel Plant,* v. 42, Sept. 1954, p. 1066-1068.

Equipment for production of special quality steels on small commercial scale. Diagram, photographs. (D8 ST)

385-D. Electric Steel Production. IV. Technological Developments. D. D. Howat. *Iron & Steel,* v. 27, Sept. 1954, p. 446-450.

Major advances in electric arc melting techniques. 42 ref. (D5, ST)

386-D. Improved Cleaning Techniques for Open Hearth Checkers. J. J. Enochs and Reece Kincaid. *Iron and Steel Engineer,* v. 31, Aug. 1954, p. 79-82; disc., p. 82-83.

Advantages in use of high-pressure stream of chemical solvent jetted against hot deposit. Photographs, diagrams. (D2)

387-D. Transformers for the Steel Industry. *Iron and Steel Engineer,* v. 31, Aug. 1954, p. 118-135.

Includes "Transformer Materials", D. C. Graham and L. R. Bronlund; "The Application of Transformers in the Steel Industry", L. G. Levoy; and "Power Transformer Preventive Maintenance in the Steel Industry". E. A. Elge. (D general)

388-D. The Electric Ingot Process. *Iron and Steel Engineer,* v. 31, Aug. 1954, p. 154, 157.

Outline of a continuous melting and casting process. Photographs, diagram. (D9, ST)

389-D. Sulphur in Silicate and Aluminate Slags. F. D. Richardson and C. J. B. Fincham. *Iron and Steel Institute, Journal,* v. 178, Sept. 1954, p. 4-15.

Study on partition of sulfur in gases and slag for various operating conditions and slag compositions in blast furnace and openhearth. Tables, graphs. 31 ref. (D1, D2, B21, ST)

390-D. Linings for Induction Furnaces. H. E. White. *Meal Progress,* v. 66, Sept. 1954, p. 99-106.

Magnesia-alumina mixes and zircon are favored for special steels and high alloys. Do's and don'ts for the melting superintendent. Properties of the minerals and the refractory and manufacuring processes. (D6, AY)

391-D. Blast Furnace Exploration. Use of a Continuous Flow Counter. T. W. Johnson and D. Meachen. *Research,* v. 7, Sept. 1954, p. 356-359.

Measurement of transit time of gases through a furnace burden. Graphs, diagrams. 2 ref. (D1)

392-D. (German.) **The Metallurgy of the Blast Furnace.** Theo Kootz, Alfred Michel, and Heinrich Rellermeyer. *Archiv für das Eisenhüttenwesen,* v. 25, nos. 7-8, July-Aug. 1954, p. 299-306.

Factors effecting arc reduction, silicon and manganese reaction, effect of carbon content, computation of saturation points of carbon in iron and equilibria beween pig iron and slag with solid carbon. Graphs, table. 25 ref. (D1, CI)

393-D. (German.) **The Iron-Sulfur-Oxgen System and Its Importance as a Basis for the Reactions of Iron Sulfides With Sulfur Dioxide to Form Iron Oxides and Sulfur Vapor.** Norbert G. Schmahl. *Archiv für das Eisenhüttenwesen,* v. 25, nos. 7-8, July-Aug. 1954, p. 315-319.

Studies of equilibria to determine possible reactions and new graphic process of treating such ternary systems. Graphs, tables. (D general, P12, ST)

394-D. (Russian.) **Analytical Method of Calculating Asymmetrical Conditions of Three-Phase Electric Arc Furnaces.** N. A. Markov. *Elektrichestvo,* 1954, no. 8, Aug., p. 47-51.

Includes graphs. 3 ref. (D5)

395-D. Promising Blast Furnace Supplements. Arthur J. Stone. *Battelle Technical Review,* v. 3, Oct. 1954, p. 105-108.

Prospective shortages in high-quality coke and iron ore can be alleviated with new equipment or processes developed to smelt either low-grade ores or high-grade concentrates with low-grade fuels. Electric low-shaft furnaces described and effects of using enriched blast and prepared charges evaluated. Diagrams. (D1)

396-D. Possibilities of Reducing the Phosphorus Content of Cast Iron. R. I. Higgins. *British Cast Iron Research Association. Journal of Research and Development,* v. 5, Aug. 1954, p. 390-413.

Reactions of phosphorus in blast furnace; dephosphorization in the cupola and blast furnace; methods for increasing silicon and manganese contents of iron-carbon alloys. Tables, graphs, micrographs, diagrams. 29 ref. (D1, E10, CI)

397-D. New Iron Industry in South Africa. W. Williams. *Chemical & Process Engineering,* v. 35, Sept. 1954, p. 285.

Based on Krupp-Renn process for low-grade ores. (D8, Fe)

398-D. Details of Timken Induction Stirrer. Quentin Graham. *Electric Furnace Steel Proceedings,* v. 11, 1953, p. 22-23.

Description of magnetic core, winding, cooling and power supply. (D6)

399-D. Rotating Magnetic Stirrer for the Arc Furnace. E. H. Browning and M. F. Jones. *Electric Furnace Steel Proceedings,* v. 11, 1953, p. 23-29.

Design of experimental holding ladle and stirrer, results of experimental tests and cause of stirring motion. Photographs, diagrams, graphs. (D5)

400-D. Development of Induction Stirring. Eric G. Malmlow. *Electric Furnace Steel Proceedings,* v. 11, 1953, p. 11-22; disc., p. 29-33.

Principles, equipment and applications. Photographs, diagrams, graphs. 18 ref. (D6)

401-D. Deoxidation and Its Effects on the Physical Properties of Steel. C. F. Christopher. *Electric Furnace Steel Proceedings,* v. 11, 1953, p. 101-115; disc., p. 115-120.

Good deoxidation, inclusions, furnace operation and critical oxygen level. Graphs, table. 4 ref. (D2, P12, ST)

402-D. Sulphide and Oxide Formation in Steel. Walter Crafts and D. C. Hilty. *Electric Furnace Steel Proceedings,* v. 11, 1953, p. 121-145; disc., p. 145-150.

Mechanism of inclusion formation and its application to a rationalization of some of the anomalies observed in practice. Graphs, micrographs. 31 ref. (D9, ST)

403-D. New Developments and Trends in Design and Operation of Electric Furnaces. W. E. Lewis. *Electric Furnace Steel Proceedings,* v. 11, 1953, p. 164-174.

Mechanical improvements, electrical advances, developments in electric counterbalancing, statistics and predictions. Photographs, graphs. (D5)

404-D. New Developments in Electric-Arc Furnace Design and Operation. Charles W. Vokac. *Electric Furnace Steel Proceedings,* v. 11, 1953, p. 174-178.

Principle, advantages and uses of the Whiting control. Diagram. (D5)

405-D. Developments in Arc Furnace Design and Operation. E. A. Hanff. *Electric Furnace Steel Proceedings,* v. 11, 1953, p. 178-180; disc., p. 180.

Electrical equipment, working conditions, safety and production line. (D5)

406-D. Design, Operation, and Maintenance of Modern Large High-Powered Electric-Arc Furnaces. George D. Lawrence. *Electric Furnace Steel Proceedings,* v. 11, 1953, p. 187-192; disc., p. 193, 312.

Problems and possible solutions associated with electric steelmaking process and its demands for design of larger, more complex, and higher powered furnaces. (D5)

407-D. Solidification of Steel in Ingot Molds. L. H. Nelson. *Electric Furnace Steel Proceedings,* v. 11, 1953, p. 226-241; disc., p. 241-243.

Mechanism of and relation between transverse and vertical solidification, solidification curves, calculation of time of solidification and K-value of transverse solidification from mold data. Tables, graphs. 9 ref. (D9, N12, ST)

408-D. Nitrogen in Stainless Steel. H. P. Rassbach, E. R. Saunders and W. L. Harbrecht. *Electric Furnace Steel Proceedings,* v. 11, 1953, p. 244-256; disc., p. 256-268.

Behavior of nitrogen in melting process for stainless steels and its bearing on improved production of nitrogen steels. Graphs, tables. 13 ref. (D5, SS)

409-D. Inclusions in Steel From Pouring Refractories. D. J. Carney and E. C. Rudolphy. *Electric Furnace Steel Proceedings,* v. 11, 1953, p. 274-281.

Similarity of large inclusions to refractories, nozzle and well erosion and recommendations for minimizing source of inclusions from pouring refractories. Micrographs, tables. 4 ref. (D9, ST)

410-D. Sulphur Control in Electric Furnace Steelmaking. B. R. Queneau and C. V. Klimas. *Electric Furnace*

Steel Proceedings, v. 11, 1953, p. 281-289; disc., 289-299.

Effects of carbon content, lime addition, time under reducing slag and total sulfur in system. Method of calculating slag weights required for reducing sulfur in bath. Graphs, tables. 5 ref. (D5, ST)

411-D. Chemistry of Acid Electric Steelmaking. N. F. Dufty. *Foundry*, v. 82, Oct. 1954, p. 120-125, 260-263.

Slag systems, slag metal reactions, carbon oxidation, iron oxide control and special slags. Graphs, tables. 17 ref. (D5, ST)

412-D. Acid Open Hearth Furnace Bottoms. I. *Industrial Heating*, v. 21, Sept. 1954, p. 1770, 1772, 1776, 1778.

Installation, maintenance and care. (To be continued.) (D2, ST)

413-D. New Techniques for Furnace Scanning. *Mechanical World and Engineering Record*, v. 134, Sept. 1954, p. 421.

Visual, photographic and cinematographic examination of interiors of openhearth and blast furnaces are valuable tools for steel research. (D1, D2, ST)

414-D. Mechanism of Reduction of Iron Oxides With Hydrogen, Carbon Monoxide, and Mixtures of These Gases. V. A. Roiter, V. A. Yuza and A. N. Kuznetsov. *Henry Brutcher, Altadena, Calif., Translation no.* 3313, 18 p. (From *Zhurnal Fizicheskoi Khimii*, v. 25, no. 8, 1951, p. 960-970.)

Investigation into processes of reduction of chemically pure ferric oxide with hydrogen, carbon monoxide and mixtures thereof, at temperatures as low as possible so as to eliminate the influence of macrofactors. Graphs, diagrams. 13 ref. (D general, Fe)

415-D. (French.) **Characteristics of German Openhearth Furnaces.** K. Guthmann. *Centre de Documentation Sidérurgique, Circulaire d'Informations Techniques*, v. 11, no. 9, 1954, p. 1575-1621. (Extracts from the "Confidential Report of the V.D.E." on studies carried out between 1939 and 1945, Verlag Stahleisen, Dusseldorf, 1953, p. 319-356.)

Analyzes answers to questionnaire sent in 1943 to all openhearth plants in Germany, Poland and Bohemia-Moravia regarding production characteristics, fuel consumption and refractory life. Tables, graphs. 26 ref. (D2, ST)

416-D. (French.) **Mechanization in Iron Mines. Its Influence on the Operating of Blast Furnaces and Production Costs for Pig Iron.** M. Gerin. *Centre de Documentation Sidérurgique, Circulaire d'Informations Techniques*, v. 11, no. 9, 1954, p. 1689-1693; disc., p. 1673-1674.

Influence of mechanization of loading in mines on winning methods and on pig iron production costs. Tables. (D1, B12, Fe)

417-D. (French.) **The Viscosity of Blast Furnace Slags.** Paul Kozakevitch. *Revue de métallurgie*, v. 51, no. 8, Aug. 1954, p. 569-587.

Viscometer with coaxial cylinders makes it possible to establish temperature at which crystallization begins by making measurements at temperature intervals. Tables, graphs. 26 ref. (D1, B21)

418-D. (Book.) **Electric Furnace Steel Proceedings**, v. 11, 1953, 322 p. American Institute of Mining and Metallurgical Engineers, 29 W. 39th St., New York 18, N. Y.

Collection of 29 papers covering induction stirring in arc furnaces, jet engine steels and related operating problems, inclusions in steel, mechanical aspects of electric furnace operators, modern high-powered arc furnace, and ingot metallurgy. Papers are individually abstracted. (D5, ST)

E Foundry

601-E. Investment Casting Practice. *Aircraft Engineering*, v. 26, Sept. 1954, p. 315-316.

Current methods in England. Photographs. (E15)

602-E. Cupola Bed Practice. Donald E. Matthieu. *American Foundryman*, v. 26, Sept. 1954, p. 40-45.

Eight methods recommended for lighting-off and burning-in the coke bed. Photographs. (E10)

603-E. Carbon Dioxide Process for 'Baking' Molds and Cores. *American Foundryman*, v. 26, Sept. 1954, p. 46-49. (Translated from "Das Kohlensäure-Erstarrungsverfahren in der Giesserei". *Giesserei*, v. 40, no. 26, Dec. 24, 1953, p. 678-681.)

Previously abstracted from the original. See item 142-E, 1954. (E18)

604-E. Revised Spiral Test Relates Fluidity to Phase Diagram. W. A. Spindler, W. B. Pierce and R. A. Flinn. *American Foundryman*, v. 26, Sept. 1954, p. 56-58.

Simplified, reproducible fluidity spiral design measures metal flow and shows how fluidity of alloys is related to value of pouring temperature above the liquidus. Tables, photograph, graph, diagram. 3 ref. (E25, M24)

605-E. Largest Propellers Cast Are for Saratoga. *Bureau of Ships Journal*, v. 3, Sept. 1954, p. 6-7.

Size, alloy composition and mold details. Photographs. (E11, T24, Cu)

606-E. Foundry Quality Control. I. Allin P. Deacon. *Canadian Metals*, v. 17, Sept. 1954, p. 30, 32, 34.

Demonstrates that statistical quality control pays dividends in any foundry. Charts. (To be continued.) (E general, S12)

607-E. Get the Facts on Shell Molding. Annesta R. Gardner. *Dun's Review and Modern Industry*, v. 64, Sept. 1954, p. 40-44.

What it offers and how it's done. Photographs. (E16)

608-E. Centrifugal Method of Metallurgical Research. R. V. Riley and B. T. Gillyatt. *Foundry Trade Journal*, v. 97, Aug. 19, 1954, p. 209-217; Aug. 26, 1954, p. 237-244; disc., p. 244-248.

Constructional details of centrifuge and experimental applications with molten cast iron. Compares segregation, microstructures and cooling rates of static and centrifugally cast specimens. Diagrams, tables, micrographs, graphs, photographs. 18 ref. (E14, CI)

609-E. Ford Compaction Moulding. A. R. Parkes. *Foundry Trade Journal*, v. 97, Sept. 2, 1954, p. 255-260.

Description and advantages of a new precision casting method. Photographs, table. (E15, CI)

610-E. "Warm" Blast for Cupolas. *Foundry Trade Journal*, v. 97, Sept. 2, 1954, p. 263-264.

Description and advantages of air preheating to 250° C. Diagrams, table. 3 ref. (E10, CI)

611-E. Die-Pressing of Gutters. R. S. M. Jeffrey and J. A. Richards. *Institute of British Foundrymen, Paper no.* 1097, 1954, 11 p.

Equipment and techniques for producing low-cost gray iron eave troughs. Photographs, diagrams, micrographs, table. 3 ref. (E13, CI)

612-E. Production of Heavy Steel Castings. S. Taylor. *Institute of British Foundrymen, Paper no.* 1099, 1954, 6 p.

Techniques for producing very large castings. Diagrams, photographs, graph. (E general, CI)

613-E. How Melting Practice Affects Machinability of Malleable Iron. E. A. Loria. *Iron Age*, v. 174, Sept. 16, 1954, p. 168-170.

Prevention of ferritic edges by carbon dioxide decarburizing found to be best process. Micrographs, tables. 3 ref. (E25, G17, CI)

614-E. Better Permanent Mold Techniques Improve Casting Quality. H. E. Zahn. *Iron Age*, v. 174, Sept. 16, 1954, p. 174-175.

Production of storage battery grids. Photographs. (E12, Pb)

615-E. Casting Grey Iron in Iron Dies. *Machinery (London)*, v. 85, Aug. 27, 1954, p. 450-455.

Runners and gates, and casting of various cored components. Photographs, diagram. (E22, CI)

616-E. Mechanization of Shell Moulding. A. Dunlop. *Metal Industry*, v. 85, Aug. 27, 1954, p. 163-167; Sept. 3, 1954, p. 192-193.

Basic process and recent developments in processing techniques. Tables, diagrams, graphs, photographs. 8 ref. (E16)

617-E. Castings for Aircraft. (Digest of "Casting Potentials", by Lon C. Kappel; *Aviation Age*, May-June 1954.) *Metal Progress*, v. 66, Sept. 1954, p. 152-154, 156.

Description and results of research on use of castings in aircraft. (E general, T24, Al)

618-E. Zinc: Supply Good—Uses Increasing. Ernest V. Gent. *Precision Metal Molding*, v. 12, Sept. 1954, p. 52-54, 127.

Favorable outlook for zinc alloy die castings from view point of supply, mechanical properties and low-cost casting characteristics. Photographs, diagrams. (E13, T general, Zn)

619-E. Aluminum Trend Is Toward Larger Die Castings. Carl H. Burton. *Precision Metal Molding*, v. 12, Sept. 1954, p. 55-57, 104.

New 72-in. die-casting machine opens new fields. Advantages and uses of aluminum die castings. Photographs, graph, diagram. (E13, Al)

620-E. Magnesium: Die Castings Enter the Automotive Field. E. L. Schaper. *Precision Metal Molding*, v. 12, Sept. 1954, p. 58-59, 114-115.

Fields of application, die casting procedure, finishing, advantages and future. Photographs. (E13, T21, Mg)

621-E. Battery Research Improved Lead Castings. H. E. Zahn. *Precision Metal Molding*, v. 12, Sept. 1954, p. 68-69, 72, 103-104.

Study of lead permanent mold castings used in batteries. Photographs. (E12, T10, Pb)

622-E. Plaster Casting the Light Metals. George R. Gardner. *Product Engineering*, v. 25, Sept. 1954, p. 164-168.

Casting design, mechanical properties, finishes and applicable alloys. Photographs, tables, diagram. (E16, Al, Mg)

623-E. (Dutch.) **The Nodulation of Cast Iron.** J. Kol and J. E. De Graaf. *Metalen*, v. 9, no. 15, Aug. 15, 1954, p. 237-243.

Experiments for establishing suitability of pig iron for production of nodular cast iron. Effects of increasing additions of magnesium and silicon upon the structure, mechanical properties and nodule stability. Graphs, tables. 3 ref. (E25, Q general, CI)

624-E. (German and French.) **Problems of Design and Choice of Alloys in Sand and Mold Casting of Light Metal.** E. Gautschi. *Aluminium*

Suisse, v. 4, no. 4, July 1954, p. 118-134.

Making molds by hand and machine, permanent mold casting, choice of alloy, calculation of wall thickness and nondestructive testing. Diagrams, tables, photographs. (E18, E19, E12, S general)

625-E. (German and French.) **The Casting of Aluminum in Ceramic Molds.** E. Witzig and A. Wernley. *Aluminium Suisse*, v. 4, no. 4, July 1954, p. 138-139.

Application of ceramic material containing lithium for production of molds which are not destroyed by the casting process. Photographs. (E12, Al)

626-E. (German.) **New Processes of Wet Sorting Fine Sand.** Helmut Trawinski. *Giesserei*, v. 41, no. 17, Aug. 19, 1954, p. 433-437.

New equipment for processing and sorting sands to meet any specification. Photographs, diagram, and graphs. 16 ref. (E18)

627-E. (German.) **Chemically Hardened Mold Mixtures.** St. Hajduk. *Giesserei*, v. 41, no. 17, Aug. 19, 1954, p. 439-440.

Chemical hardening with CO_2, proper and improper sectioning of core boxes and injection of CO_2 gas. Diagrams. 1 ref. (E19)

628-E. (German.) **Production of a Double-Mold Arrangement for the Side Parts of Sewing Machines.** Ch. Weiss. *Giesserei*, v. 41, no. 17, Aug. 19, 1954, p. 441-443.

Specifications for formation of plaster patterns, master lead patterns, casting in brass and production of wood patterns for match plates. Drawings. (E19)

629-E. Investment Castings. *Automobile Engineer*, v. 44, Sept. 1954, p. 367-373.

Process and range of application in repetition production of high-precision work. Photographs, table. (E15)

630-E. Sand Cooling and Dust Control. W. D. Bamford, F. M. Shaw and J. Bright. *British Cast Iron Research Association. Journal of Research and Development*, v. 5, Aug. 1954, p. 367-374 + 2 plates.

Means of determining relative degree of sand cooling obtainable from various units of foundry equipment and most effective means of cooling with a minimum dispersal of dust. Diagrams, tables, photograph. (E18, A5)

631-E. 10-Ton Capacity Holding Furnace. *Engineer*, v. 198, Sept. 17, 1954, p. 398.

Holder for molten cast iron. Photograph, diagram. (E10, CI)

632-E. Modern Design Characterizes New Fairbanks Morse Foundry. William G. Gude. *Foundry*, v. 82, Oct. 1954, p. 104 + 10 pages.

Layout and equipment in foundry for production of gray iron, brass and stainless steel castings. Photographs, flow sheet. (E general, CI, Cu, SS)

633-E. Wet Sand Reclamation. Hubert Chappie. *Foundry*, v. 82, Oct. 1954, p. 112-114.

Equipment and process for economical reclamation of foundry sand. Photographs, flow sheet, table. (E18)

634-E. The Small Foundry Can Use Modern Methods. Edwin J. Jory. *Foundry*, v. 82, Oct. 1954, p. 115, 264, 266-268.

Steps for evaluating new foundry methods. (E general)

635-E. Simple System Provides Rapid Cupola Charging. Edwin Bremer. *Foundry*, v. 82, Oct. 1954, p. 116-119.

Materials handling equipment and operation sequence. Photographs. (E10, A5, CI)

636-E. Quality Control in a Gray Iron Foundry. Lester Welty. *Foundry*, v. 82, Oct. 1954, p. 126-129.

Statistical approach to scrap control problem. Photographs, chart. (E general, S12, A8, CI)

637-E. Solving Problems in the Brass Foundry. Harold J. Roast. *Foundry*, v. 82, Oct. 1954, p. 130-131, 258-260.

Suggested remedies for typical foundry problems. (E general, Cu)

638-E. Close Tolerance Castings. Malcolm W. Riley. *Materials & Methods*, v. 40, Sept. 1954, p. 121-136.

Advantages and limitations of investment, plaster, permanent mold, die, shell mold and special sand castings to aid in selection of a metal forming method. Photographs, table. (E general)

639-E. (Book.) **Non-Ferrous Heavy-Metal Fabrication in the U. S. A.** (Technical Assistance Mission No. 79.) 258 p. 1954. Organization for European Economic Co-Operation. 2 rue André Pascal, Paris, France. 800 fr.

Report of fabrication of sheet, strip, rods, sections, tube and wire of heavy nonferrous metals and alloys. Casting and working of copper and copper alloys. (E general, F general, G general, Cu)

F

Primary Mechanical Working

339-F. Surface Temperature—Lubrication Relations During Drawing of Copper Wire. J. S. Hoggart. *Australasian Engineer*, 1954, June, p. 44-50.

By means of a thermocouple die the surface temperature attained by a copper wire during drawing was determined over a range of speeds from 26 to 1280 ft. per min., for three different lubricants. Graphs, diagrams, tables. 11 ref. (F28, F1, Cu)

340-F. The Effect of Surface Temperatures Attained During Drawing on the Tensile Strength of Copper Wire. J. S. Hoggart and S. Z. M. Kopczynski. *Australasian Engineer*, 1954, June, p. 50-53.

Relationship explained in terms of stress distribution and theory of flow and fracture. Graphs, table, diagram. 6 ref. (F28, Q23, Cu)

341-F. Driving and Controlling Wire Drawing Machines. I. J. Raymond Erbe and H. A. Dickerson. *Blast Furnace and Steel Plant*, v. 42, Sept. 1954, p. 1048-1052.

Development and operation of modern wire drawing equipment. Photographs. (F28)

342-F. Sendzimir Planetary Hot Mill. John H. Mort. *Iron & Steel*, v. 27, Sept. 1954, p. 451-455.

Mathematical observations on operation. (To be continued.) (F23)

343-F. Seamless Tubes. D. E. Brooks. *Iron & Steel*, v. 27, Sept. 1954, p. 459-461.

Production methods. Photographs. 6 ref. (F26, ST)

344-F. Tension Regulator on Kaiser Temper Mill. W. R. Harris and L. F. Stringer. *Iron and Steel Engineer*, v. 31, Aug. 1954, p. 71-77; disc., p. 77-78.

Magnetic amplifier application and its operating results. Photographs, diagrams, graphs. (F23)

345-F. Recent Advancements in Continuous Butt and Induction Weld Pipe Mills. William Rodder. *Iron and Steel Engineer*, v. 31, Aug. 1954, p. 108-115; disc., p. 115-117.

New mill layouts and changes in design of equipment have made possible increased pipe speeds. Photographs, diagrams, tables. (F26, CN)

346-F. Modernization of Skelp Mill at Wheeling Steel's Benwood Works. S. W. Crisman. *Iron and Steel Engineer*, v. 31, Aug. 1954, p. 148-150.

Method of coping with problem when capacity of pipe mills becomes greater than supply of skelp. Photographs, diagram, graph, table. (F26, A5, CN)

347-F. Steel Mill Lubrication Problems. A. C. Keiser, Jr., E. E. Perso, W. H. Mandy and M. S. Clark. *Iron and Steel Engineer*, v. 31, Sept. 1954, p. 177-182; disc., p. 182-184.

Effects of water, scale, dirt, and operating variables on various lubricants. Tables, diagrams. (F1)

348-F. Helper Drives Help Steel Processing Lines. E. E. Vonada. *Iron and Steel Engineer*, v. 31, Sept. 1954, p. 192-196; disc., p. 196.

Auxiliary equipment in rolling mills. Photograph, diagrams. (F23)

349-F. Two-High/Four-High Combination Mill Aids Rolling Research. A. I. Nussbaum. *Iron and Steel Engineer*, v. 31, Sept. 1954, p. 199, 202, 205.

Experimental equipment for study of rolling problems. Photographs, tables. (F23)

350-F. New Combination Rod Mill Will Develop High Speed. A. F. Kenyon. *Iron and Steel Engineer*, v. 31, Sept. 1954, p. 210, 212.

Mill to produce steel rod from 0.205 to 1⅛ in. in diameter. Table, diagram. (F27, CN)

351-F. Calculation of Roll Force and Torque in Cold-Rolling by Graphical and Experimental Methods. R. B. Sims. *Iron and Steel Institute, Journal*, v. 178, Sept. 1954, p. 19-34 + 6 plates.

Derivation of equations and experimental verification for various rolling problems. Graphs, photograph, diagrams, tables. 19 ref. (F23)

352-F. Precision Forging Stainless Steel Compressor Blades for Gas Turbines. *Machinery (London)*, v. 85, Aug. 27, 1954, p. 419-429.

Technique and advantages of process in producing to close tolerances a large number of blades. Production and servicing of forging dies. Photographs. (F22, T25, SS)

353-F. The Ugine-Sejournet Process for the Hot Extrusion of Steel. *Machinery (London)*, v. 85, Sept. 3, 1954, p. 471-480.

Early developments, use of glass lubricant and presses and associated equipment. Photographs, diagrams, table. (F24, ST)

354-F. Rolled Extrusion of Thin-Walled Parts. W. N. Parker. *Machinery (London)*, v. 85, Sept. 3, 1954, p. 484-487.

Process and typical applications. Diagrams, photograph. (F24)

355-F. Aluminium Alloy Forgings. L. Fletcher. *Metal Industry*, v. 85, Sept. 3, 1954, p. 185-188.

Typical forgings, alloy and size limitations, cost comparisons, and future developments. Photographs. (F22, Al)

356-F. How to Machine Stainless Steels. II. Lester F. Spencer. *Modern Machine Shop*, v. 27, Sept. 1954, p. 132-142.

Reaming, tapping and threading, milling operations, broaching, and

typical work jobs. Photographs, diagrams. (G17, SS)

357-F. Aluminum Extrusions Faster, Better, Cheaper. C. B. Huizenga. *Modern Metals,* v. 10, Sept. 1954, p. 82, 84.

Economy of producing special shapes by manufacturers of architectural products. Photographs. (F24, T26, Al)

358-F. Glass Lube Greases Way for Steel Extrusion. S. O. Evans. *SAE Journal,* v. 62, Sept. 1954, p. 35-39.

French process extends three-way gain to designers and offers economic advantages. Diagrams, table. (F1, F24, ST)

359-F. The Rolling of Metals and Alloys. II. Principles Underlying the Design, Use and Reproduction of Roll Cambers. E. C. Larke. *Sheet Metal Industries,* v. 31, no. 329, Sept. 1954, p. 781-791.

Design principles for various rolling mills. Tables, diagrams, photograph, graph. (To be continued) (F23)

360-F. Counterblow Hammer vs. Drop Hammer, a Comparison. J. L. Lebach and Eli Sammett. *Steel Processing,* v. 40, Sept. 1954, p. 557-563.

Counterblow hammers shown to be more efficient and require less maintenance. Tables, graphs, diagram. 5 ref. (F22, ST)

361-F. Air Power for Metalworking. V. Using Air as a Tooling Component. William E. Hoffman. *Tooling and Production,* v. 20, Sept. 1954, p. 57-61, 168.

Applications of compressed air in forging, milling and riveting operations. Diagrams. (F22, G17, K13)

362-F. Wire Flattening—an Appraisal of Today's Theory and Practice. II. Wire Flattening Practice. A. I. Nussbaum. *Wire and Wire Products,* v. 29, Sept. 1954, p. 961-965, 1033.

Design and operation of modern mill equipment. Photographs, diagram. (F29)

363-F. (English.) **Drawing Force Through Die. Circular Arc-Type Die and Straight-Line Type Die.** Hiroshi Yamanouchi and Ikuhiko Hayashi. *Castings Research Laboratory, Report, Waseda University,* 1954, no. 5, p. 50-52.

Theoretical and experimental determinations on mild steel rod. Diagrams, graph. (F27, CN)

364-F. (Polish.) **Comparison of Calculation Methods of Roll Pressure in Hot Rolling Process.** Z. Wusatowski and S. Bala. *Prace Instytutow Ministerstwa Hutnictwa,* v. 6, no. 3, 1954, p. 120-132.

Factory measurements used to evaluate various calculating schemes. Graphs, tables. 12 ref. (F23, ST)

365-F. Drawbench for Large Aluminium Alloy Tubes. *Engineer,* v. 198, Sept. 10, 1954, p. 356-358.

Machine adapted for both plug and mandrel drawing produces tubes from 4 in. to 17 in. diameter. Photographs, diagrams. (F26, Al)

366-F. International Nickel Expands Facilities for Producing Cold Drawn Rods and Tubes. *Industrial Heating,* v. 21, Sept. 1954, p. 1726-1728, 1730.

New section extends length limitations on rods and tubes and triples capacity for producing heat exchanger tubes. Photographs. (F26, F27, Ni)

367-F. Sixty-Cycle Induction Heating of Large Steel Sections for Hot Forming. C. H. Hartwig. *Industrial Heating,* v. 21, Sept. 1954, p. 1732, 1734, 1880, 1882.

Theory of induction heating, experimentation, coil description. Graphs, photograph, diagram. (To be continued.) (F22, G1, J2, S2)

368-F. Carbides—Advantages and Limitations. C. H. Good. *Machinery (London),* v. 85, Sept. 10, 1954, p. 573-575.

Composition, properties, application and future of carbides in wire-drawing dies. Photographs, micrographs, graph. (F28, C-n)

369-F. (English.) **Precision Measurement of Wire Drawing Dies.** Tadashi Hisamoto and Kimio Kakizaki. *Hitachi Review,* 1954, no. 6, July, p. 127-133.

Form and measurement of dies, measurement of die angle, hole surface roughness and die hole circularity, application of circularity measurement method. Tables, diagrams, micrograph, photograph, graphs. 12 ref. (F28)

370-F. (German.) **Reconstruction of a 550-MM. Staggered Roll Train by Joining a Separate Continuous Roll Line for Rolling Hot Strip and Tube Strips.** Herbert Müller. *Stahl und Eisen,* v. 74, no. 18, Aug. 26, 1954, p. 1132-1136.

Equipment for continuous rolling of tube strip. Diagrams, photographs, table. (F26, CN)

371-F. (German.) **Standardizing Extrusion Press Tools.** Kurt Laue and Matthias Arenz. *Zeitschrift für Metallkunde,* v. 45, no. 8, Aug. 1954, p. 461-464.

Reasons and recommendations for standardization of equipment. Graphs, tables, diagrams. (F24)

372-F. (German.) **The Sendzimir Cold-Strip Rolling Mill.** Heinrich Bischoff. *Zeitschrift für Metallkunde,* v. 45, no. 8, Aug. 1954, p. 464-468.

Design and examples of use in rolling steel and nonferrous metals. Diagrams, photographs. (F23)

G
Secondary Mechanical Working

527-G. New Techniques for Titanium. Ralph A. Haver and David S. Adams. *Aero Digest,* v. 69, Sept. 1954, p. 42, 46, 48.

Fabrication methods including riveting, drilling, cutting, forming, and welding. Photographs, table. (G general, K general, Ti)

528-G. Shop Hints Help Form and Mill Titanium. *American Machinist,* v. 98, Sept. 13, 1954, p. 129-133.

Presentation of data pertinent to designing and planning for production. Diagrams, photographs. (G general, Ti)

529-G. Cope Talks on Draw Dies. XIX. Stampings Often Require Burred or Flanged Holes. Stanley R. Cope. *American Machinist,* v. 98, Sept. 13, 1954, p. 140-143.

Analysis of several kinds of burrs, their formulas and maximum proportions. The beginning of a series of dies to make them. Diagrams. (G3)

530-G. Ti-Stainless Machined Like Butter. George Glaeser. *American Machinist,* v. 98, Sept. 13, 1954, p. 144.

Key to good tool life, surface finishing and production accomplished by proper coolant. Photographs, diagram. (G17, G21, Ti)

531-G. How to Calculate Exact Wheel Profiles for Form Grinding Helical-Gear Teeth. Oliver Saari. *American Machinist,* v. 98, Sept. 13, 1954, p. 172-175.

Derivation of formulas for computing coordinates, pressure angle and radius of curvature of cutter form, and use of computed data in establishing the settings of the radius-dressing fixture. Diagrams, table. 3 ref. (G18)

532-G. Developments in the Sparcatron Spark-Machining Process. *Machinery (London),* v. 85, Sept. 3, 1954, p. 488-492.

Principles, equipment and applications. Photographs. (G17)

533-G. Flow-Form Dimpling Operations. Gilbert C. Close. *Machinery (London),* v. 85, Sept. 3, 1954, p. 499-501.

Equipment and procedures. Diagrams, photograph. (G2)

534-G. The Importance of Applied Science in the Machining of Metals. Edward Bruin. *Canadian Metals,* v. 17, Sept. 1954, p. 44, 46, 48, 50.

Principles of chip formation, cutting fluids, cutting conditions and "secondary" phenomena. (G17, G21)

535-G. Learning Metalwork With Aluminium. I. John C. Older. *Light Metals,* v. 17, Sept. 1954, p. 302-303.

Materials and tools for fabricating sheet aluminum. Diagrams. (G general, Al)

536-G. Turning Titanium Jet Compressor Discs. John L. Elliott. *Machine and Tool Blue Book,* v. 49, Sept. 1954, p. 159 + 6 pages.

Tooling, machining and problems. Photographs. (G17, Ti)

537-G. Bolt Cold-Heading and Inspection at International Harvester. J. P. Lehning. *Machinery,* v. 61, Sept. 1954, p. 171-173.

Automatic boltmakers and accessory equipment. Inspection by magnetic particle method. Photographs. (G10, S13, CN)

538-G. Brass Wheels Grind Carbides. Arthur A. Merry and Leslie F. Wheeler. *Machinery,* v. 61, Sept. 1954, p. 174-177.

Grinding by high-frequency arc discharge. Photographs. (G18, Cu, C-n)

539-G. Low-Cost Press Tools for Moderate Production Requirements. G. C. Matson. *Machinery,* v. 61, Sept. 1954, p. 196-197.

Design and manufacture of low-cost, semihard dies. Photographs, diagram. (G1, TS)

540-G. Machining Titanium. *Metal Industry,* v. 85, Aug. 13, 1954, p. 127-128.

Cutting lubricants, turning, drilling, tapping, milling, and sawing. Table, diagram. (G17, G21, Ti)

541-G. Steel Cartridge Cases. (Digest of "Steel Cartridge Cases", by William N. King; *Ordnance,* July-Aug. 1954, p. 49.) *Metal Progress,* v. 66, Sept. 1954, p. 198, 200.

Twin Cities Arsenal makes 45-caliber cases of steel or brass at same rate. See item 543-G, below. (G4, T2, ST)

542-G. Carbide Tooling for Multiple Spindle Bar Automatics. Fred W. Vogel. *Modern Machine Shop,* v. 27, Sept. 1954, p. 144-150.

Application of cemented carbides to automatic machines. Photographs, diagrams. (G17, T7, C-n)

543-G. Steel Cartridge Cases. William N. King. *Ordnance,* v. 39, July-Aug. 1954, p. 49-52.

Engineering techniques and facilities meet and solve problems of manufacturing steel cartridge cases for small-arms ammunition. Photographs. (G4, T2, ST)

544-G. Types of Steel, Microstructure, Chemical Composition, Tool Compatibility—How They Affect Machinability. *SAE Journal,* v. 62, Sept. 1954, p. 47-53.

Principles of machinability based on strength, hardness, ductility and microstructure aid in selecting steels for end product. Micrographs, table, diagram. 14 ref.
(G17, M27, Q23, ST)

545-G. The Design of Simple Dies for Bending Operations. W. M. Halliday. *Sheet Metal Industries,* v. 31, no. 329, Sept. 1954, p. 729-732.

Factors to be considered in dies for precision parts. Diagrams. (G6)

546-G. Contour Forming. L. F. Spencer. *Steel Processing,* v. 40, Sept. 1954, p. 579-584.

Equipment, applications and advantages of stretch and compression forming. Photographs. (G9)

547-G. How to Increase Production. Warren Turner and Paul Gruber. *Tooling and Production,* v. 20, Sept. 1954, p. 44-49.

Use of automatic cycles, power-operated fixtures, transfer mechanisms and loading devices in machining operations. Photographs, diagrams. (G17)

548-G. Materials Handling at the Press. E. V. Crane. *Tooling and Production,* v. 20, Sept. 1954, p. 51-55.

Automatic feeding and multiple-operation tooling for stamping operations. Photographs. (G3)

549-G. Radial Forming Technique for Fabricating Sheet Metal Parts. *Welding and Metal Fabrication,* v. 22, Aug. 1954, p. 286-287.

Principal feature includes world's largest expanding mandrel which permits precision forming of large contoured closed sections to exact dimensions. Photographs. (G1)

550-G. (Dutch.) Cutting. *Metalen,* v. 9; *Handel en Industrie,* v. 9, no. 15, Aug. 15, 1954, p. 130-134.

Cleaning and polishing of cast pieces, machining of large parts. Various cutting machines and their operation. Photographs. (G17, L10)

551-G. (Russian.) Effect of Composition of Interelectrode Medium on Deterioration of Disk-Cathode and Efficiency of Electric-Spark Machining of Metals. V. K. Nevezhin. *Elektrichestvo,* 1954, no. 8, Aug., p. 52-57.

Additives to electrolyte to lower rate of deterioration. Factors effecting efficiency. Tables, graphs, diagram. 5 ref. (G17)

552-G. How to Work Stainless Steel. Richard E. Paret. *American Machinist,* v. 98, Sept. 27, 1954, p. 129-140.

Fabricating characteristics of 31 standard grades. Tables, photographs. (G general, SS)

553-G. The Influence of Chemical Composition on the Machinability of Rephosphorized Open Hearth Screw Steel. E. J. Paliwoda. *American Society for Metals, Transactions,* v. 47, *Preprint No.* 10, 1954, 12 p.

Tests on effects of carbon, silicon, sulfur, manganese, phosphorus and nitrogen show that carbon, silicon and sulfur contents are most critical and require strict control. Photographs, tables, graphs, micrographs. 12 ref. (G17, CN)

554-G. Colloidal Molybdenum Disulphide. F. Gordon Kay. *Automobile Engineer,* v. 44, Sept. 1954, p. 357-358.

Development and applications as a lubricant on dies, molds, press and cutting tools. Test data. Table. (G21, F1)

555-G. Ultrasonic Machining. *Machinery Lloyd (Overseas Ed.),* v. 26, Sept. 11, 1954, p. 87-90.

Principle and versatility of instrument which drills holes of complex shapes in ceramics, tungsten and titanium carbides. Photographs, diagrams. (G17)

556-G. Which Method for Deep Drawing Titanium. Ralph G. Gillespie and J. Walter Gulliksen. *Materials & Methods,* v. 40, Sept. 1954, p. 98-101.

Advantages of hot and cold forming. Photographs. (G4, Ti)

557-G. Relating Feed to Speed in Metal Cutting. *Metal-Working,* v. 10, Oct. 1954, p. 16-17.

Limiting factors in general cutting and cutting with small drills. Graphs. (G17)

558-G. Selecting the Best Method for Cutting Standard Steel Shapes. *Meal-Working,* v. 10, Oct. 1954, p. 18-19.

Guide to shop cutting problems. Reference chart. (G17, ST)

559-G. The Arc-Air Process. M. D. Stepath. *Welding Journal,* v. 33, Sept. 1954, p. 860-864.

Description and operation of metal cutting process. Photographs, graph, tables. (G22)

560-G. (Book.) Drilled Holes for Tapping. A Guide to the Correct Selection of Tap Drills. 24 p. 1954. Metal Cutting Tool Institute, 405 Lexington Avenue, New York 17, N. Y.

Factors to be considered in drilling and tapping operations. (G17)

H
Powder Metallurgy

136-H. Industrial Diamond Substitutes. I. Physical and X-Ray Study of Hafnium Carbide. Perry G. Cotter and J. A. Kohn. *American Ceramic Society, Journal,* v. 37, Sept. 1954, p. 415-420.

Data, gathered in process of preparing hafnium carbide, evaluated as a potential industrial diamond substitute. Tables, graph, micrographs. 14 ref.
(H general, T6, Hf, C-n)

137-H. Research and Development in the Field of Carbides, Nitrides, Silicides, and Borides for Aircraft Propulsion. A Status Report. Lloyd D. Richardson, Sr. *Electrochemical Society, Journal,* v. 101, Sept. 1954, p. 222C-224C.

Review of Air Force research. Chief problem is impact resistance and attempts to get a better "fit" thermal expansion-wise between the carbide phase and the metal-binder phase. (H general)

138-H. Metal Carbides. H. D. Carter. *Metal Industry,* v. 85, Aug. 13, 1954, p. 123-125.

Development, preparation, characteristics and applications.
(H general, C-n)

139-H. (Polish.) Sintered Permanent Magnets. II. Sintered Magnets Containing Aluminum and Cobalt. W. Rutkowski, *Prace Instytutow Ministerstwa Hutnictwa,* v. 6, no. 3, p. 133-141.

Production method and magnetic properties. Diagrams, graph, micrographs, tables. 6 ref.
(H general, P16, SG-n)

140-H. (Polish.) Alsifers-Soft Magnetic Cores of Fe-Si-Al Powders. H. Rutkowska and B. Winsch. *Prace Instytutow Ministerstwa Hunictwa,* v. 6, no. 3, 1954, p. 149-156.

Effects of composition, annealing conditions and processing variables on magnetic properties. Micrograph, graphs, tables. 6 ref.
(H general, P16, SG-n)

141-H. Self-Diffusion and Viscous Flow (Sintering and Creep) of Compacted Metal Powders. Ya. E. Geguzin, L. O. Markon and B. Y. Pines. *Henry Brutcher, Altadena, Calif., Translation no.* 3362, 9 p. (From *Doklady Akademii Nauk SSSR,* v. 87, no. 4, 1952, p. 577-580.)

Fundamentals of diffusional movement of atoms under externally applied pressure. Shrinkage of powdered iron specimens under pressure and in absence of pressure. Calculation of coefficients of self-diffusion and activation energy for self-diffusion. Graphs. 3 ref. (H11, N1, Fe)

142-H. Sintered Nickel-Copper Alloys (Monel). F. Benesovsky. *Henry Brutcher, Altadena, Calif., Translation no.* 3363, 6 p. (From *Metall,* v. 7, nos. 21-22, 1953, p. 894-895.)

Previously abstracted from original. See item 26-H, 1954.
(H15, Ni, Cu)

143-H. (German.) Lead as an Aid in the Powder Metallurgical Production of Tungsten Tubes. Wilhelm Hofmann and Wolfgang Scheel. *Zeitschrift für Metallkunde,* v. 45, no. 8, Aug. 1954, p. 512-513.

Pressure sintering of tungsten tubes between a lead coated core and a lead tube. Properties of the tubes. Table, diagrams, graph, photograph. 2 ref. (H15, W)

144-H. (Pamphlet.) Investigation of the Bonding of Silicon Carbide by Metals. Report no. PB111415. 33 p. 1953. Office of Technical Services, U. S. Dept. of Commerce, Washington 25, D. C. $1.00.

Mechanism in bonding of cermets. Iron and a mixture of chromium and molybdenum are promising materials for binding silicon carbide. (H12, C-n)

J
Heat Treatment

297-J. Stress-Relieving of Large Fractionating Column. *Engineer,* v. 198, Sept. 3, 1954, p. 327.

Details of temporary furnace and heating schedules for treating central weldment. Photograph, diagram, graph. (J1, K general, ST)

298-J. Supplying a Fine Metallurgical Service. Roger W. Edmonson. *Industrial Gas,* v. 33, Sept. 1954, p. 3 + 5 p.

Heat treating plant. Photographs.
(J general)

299-J. Induction Surface Hardening of Ductile Iron. Joseph F. Libsch and Joseph C. Danko. *Metal Progress,* v. 66, Sept. 1954, p. 115-121.

Techniques for production of hardened surface layers. Typical structures and mechanical properties. Graphs, micrographs, tables.
(J2, Q general, CI)

300-J. Rotaflame Burners Heat Rectangular Furnace. W. Trinks. *Steel,* v. 135, Sept. 13, 1954, p. 132, 135.

Whirling flames keep temperature constant, soft spots on surface of steel mill rolls eliminated during annealing cycle. Photograph.
(J23, ST)

301-J. Heat Treatment of Aircraft Gears in Continuous Furnaces. C. A. Payntor. *Steel Processing,* v. 40, Sept. 1954, p. 585-590.

Techniques and equipment for carburizing and hardening high precision gears made of AMS 6260 steel. Micrographs, tables, photographs.
(J28, AY)

302-J. (German.) Change of Dimensions of Carburizing Steels on Case Hardening. Bruno Finnern. *Archiv*

für das Eisenhüttenwesen, v. 25, nos. 7-8, July-Aug. 1954, p. 345-350.

Correlation between dimensional change and chemical composition, core strength, surface hardness and depth of hardness. Carburization followed by simple hardening affects least change in dimensions. Tables, diagrams, micrographs. 10 ref. (J28, CN, AY)

303-J. (German.) Nitriding Tubes of Austenitic Chromium-Nickel-Molybdenum Steel With Nitrogen by the Internal-Pressure Experiment at 700° C. Franz Braumann and Hans Krächter. *Archiv für das Eisenhüttenwesen*, v. 25, nos. 7-8, July-Aug. 1954, p. 373-375.

Chemical, metallographic and X-ray study of steel nitrided 10,000 hr. shows that the nitrogen content of the nitrided layer was raised from 0.017% to 2.2%. Micrographs, table, X-ray recordings. 3 ref. (J28, ST)

304-J. Calculation of Hardenability in High Carbon Alloy Steels. C. F. Jatczak and R. W. Devine, Jr. *American Society for Metals, Transactions*, v. 47, *Preprint No.* 14, 1954, 21 p.

Effects of manganese, silicon, chromium, nickel and molybdenum studied by end-quench test for various conditions. Empirical calculation of hardenability by multiplication factors. Tables, graphs. 6 ref. (J26, AY)

305-J. Hardenability of Carbon Tool Steel. Neil J. Culp. *American Society for Metals, Transactions*, v. 47, *Preprint No.* 15, 1954, 19 p.

Construction and application of curves predicting depth of hardening. Results compared with experimental data. Tables, graphs. 14 ref. (J26, TS)

306-J. Effect of Carbon and Nitrogen on the Attainable Hardness of Martensitic Steels. A. E. Nehrenberg, Peter Payson and Peter Lillys. *American Society for Metals, Transactions*, v. 47, *Preprint No.* 16, 1954, 12 p.

Empirical equation shows relationships. Chromium had no effect on attainable hardness. Tables, graphs. 4 ref. (J26, CN, AY)

307-J. The Role of Water Vapor and Ammonia in Case Hardening Atmospheres. P. A. Clarkin and M. B. Bever. *American Society for Metals, Transactions*, v. 47, *Preprint No.* 31, 1954, 15 p.

Tests on AISI 1020 at 1475, 1550 and 1625° F. in various atmospheres. Table, graphs. 22 ref. (J2, J28, CN)

308-J. Get Up to Date on Induction Heating Control. John V. Metzger. *Control Engineering*, v. 1, Oct. 1954, p. 50-54.

Production costs reduced by consistently higher product quality through more uniform regulation of heat and by safe guarding equipment and work. Photographs, diagrams, circuit diagrams. (J2)

309-J. Continuous Annealing of Stainless Steel Sheets in Roller Hearth Furnace. *Industrial Heating*, v. 21, Sept. 1954, p. 1718-1720 + 5 pages.

Furnace construction, roller hearth mechanism, refractory radiant tubes, burner equipment, control equipment, discharge table and furnace performance. Photographs, diagram. (J23, SS)

310-J. Decarb, Distortion Exit With Salt Bath Furnace Treatment of Landing Gears. Frank Fenger. *Western Metals*, v. 12, Sept. 1954, p. 47-49.

Treatment of medium alloy steel parts up to 62½ in. long. Photographs, table, micrographs. (J2, AY)

311-J. Retention of Hardness in Medium-Carbon Steel Hard Faced by Electrospark Process. V. N. Tsvibel, B. A. Krupitskii and L. N. Balakina. *Henry Brutcher, Altadena, Calif., Translation no.* 3306, 6 p. (From *Vestnik Mashinostroeniya*, v. 33, no. 12, 1953, p. 75-76.)

Previously abstracted from original. See item 242-J, 1954. (J23, Q29, CN)

312-J. Heat Treating of Ingot Molds. H. Gau and W. Küntscher. *Henry Brutcher, Altadena, Calif., Translation no.* 3368, 4 p. (Condensed from *Metallurgie und Giessereitechnik*, v. 2, no. 4, 1952, p. 98-100.)

Study of best heat treatment for optimum structure as well as minimum residual stresses in gray-iron molds for steel ingots. Table, micrographs, graphs. (J general, CI)

K

Joining

635-K. Welding Standardization: National and International. E. P. S. Gardner. *British Welding Journal*, v. 1, Aug. 1954, p. 337-344.

Procedures in initiation and drafting of standards. Diagrams, table. (K general, S22)

636-K. Spot Welding of High-Strength Aluminium Alloys. H. E. Dixon and J. E. Roberts. *British Welding Journal*, v. 1, Aug. 1954, p. 351-370.

Effect of surface preparation, current wave shape and electrode load cycle on properties of spot welds. Diagrams, tables, graphs, micrographs. 3 ref. (K3, Al)

637-K. Fabrication and Welding in the Heavy Electrical Industry. E. H. Lee. *British Welding Journal*, v. 1, Sept. 1954, p. 385-391.

Chemical composition is less critical in avoiding welding cracks than correct control of the assembly and welding sequences. Examples of good techniques. Diagrams, photographs, graph. (K general, CN)

638-K. Practical Aspects of Automatic Welding. D. E. Baty. *British Welding Journal*, v. 1, Sept. 1954, p. 392-396.

Experience on welding of water-tube boiler drum and construction of an all-welded tanker. Photographs, tables, diagrams. (K1, CN)

639-K. Automatic Argon-Arc Welding of Low-Alloy Steel Sheet. F. J. Wilkinson. *British Welding Journal*, v. 1, Sept. 1954, p. 397-402.

Equipment and techniques for satisfactory welding of SAE 4130 sheet. Tables, diagram, photographs. (K1, AY)

640-K. The 'Twin-Argon' Welding Process. J. A. Donelan. *British Welding Journal*, v. 1, Sept. 1954, p. 403-408.

Arc phenomena, equipment design, applications and metallurgical aspects of inert-gas shielded polyphase tungsten-arc process for welding aluminum tube. Diagrams, graphs, photographs, micrographs. (K1, Al)

641-K. Transformation Temperature of Alloy Steels Related to Weldability With Low-Hydrogen Electrodes. C. L. M. Cottrell. *British Welding Journal*, v. 1, Sept. 1954, p. 409-412.

Cracking of low alloy steels is related to temperature of completion of austenite transformation in the weld. Table, graphs. 8 ref. (K9, K1, N8, AY)

642-K. Energy Distribution in Argon-Shielded Welding Arcs. J. F. Lancaster. *British Welding Journal*, v. 1, Sept. 1954, p. 412-426.

Heat losses at anode and cathode are related to potential drops for d.c., shielded-arc welding. Graphs, tables, diagrams, photograph. 15 ref. (K1)

643-K. Physical Data on Commercial Silver Solders. Karl M. Weigert. *Electrical Manufacturing*, v. 54, Sept. 1954, p. 143-146.

Thermal and mechanical properties of commercial grades. ASTM standards and government specifications. Tables. 7 ref. (K7, P12, Q general, S22, In, Ni, Cd, Zn, Cu, Ag)

644-K. Bus Copper Field-Welded by New Process. W. C. Chirgwin. *Electric Light and Power*, v. 32, Sept. 1954, p. 104-105.

Helium inert-gas shielded-arc welding process using deoxidized copper rod and borax flux. Table, diagram, photographs. (K1, Cu)

645-K. The Design and Manufacture of Welded Pressure Vessels. T. B. Webb. *Institute of Petroleum, Journal*, v. 40, Aug. 1954, p. 224-235; disc., p. 235-239.

Forming, welding and stress-relieving methods, design techniques, relations between stresses and fluid pressures, stress distribution studies. Photographs, diagrams, table. 2 ref. (K general, J1, AY, CN)

646-K. Powdered Metal Electrodes Cut Welding Costs, Gain Wider Acceptance. A. C. Ward. *Iron Age*, v. 174, Sept. 9, 1954, p. 126-127.

Contact electrodes produces quality welds at high speeds for flat or horizontal welding. Photographs. (K1, CN)

647-K. Fabricator Lowers Tooling Costs, Improves Productivity, Through Wide Use of Stud Welding. J. W. Jones. *Iron Age*, v. 174, Sept. 16, 1954, p. 161-164.

Techniques in production of large equipment. Tables, photographs, diagram. (K1, ST)

648-K. High Temperature Alloy Fastenings Require Careful Fabricating, Precision Heat Treating. T. W. Harker. *Iron Age*, v. 174, Sept. 16, 1954, p. 171-173.

Materials, fabrication, and heat treatment of bolts for high-temperature applications. Photographs, diagram, table. (K13, G general, J general, SS)

649-K. Rebuilding Steel Mill Rolls. Robert Hall. *Iron and Steel Engineer*, v. 31, Sept. 1954, p. 109-112.

Equipment and techniques for reclaiming worn or damaged rolls by automatic arc welding. Photographs. (K1, F23, ST)

650-K. Economical Roll Reclamation. J. Goldstein. *Iron and Steel Engineer*, v. 31, Sept. 1954, p. 112-114.

Machines and procedures used for submerged-arc repair of rolls. Tables, photographs, diagrams. (K1, F23, ST)

651-K. Welding Aluminium-Alloy Structures. J. E. Tomlinson. *Light Metals*, v. 17, Sept. 1954, p. 291-293.

Recent progress, including automatic submerged arc process. Table, micrographs. (To be continued.) (K1, Al)

652-K. Changing Trends in Mechanical Fasteners. W. C. Stewart. *Machine Design*, v. 26, Sept. 1954, p. 220, 222, 224.

Characteristics of bolts, nuts, screws and rivets. Photographs. (K13)

653-K. Titanium Joining. *Machinery Lloyd (Overseas Ed.)*, v. 26, Aug. 14, 1954, p. 89, 92.

Improved procedures in brazing and hard soldering. (K8, K7, Ti)

654-K. Welding Reduces Cost of Textile Machinery Parts. Dimitri G. Soussloff. *Modern Machine Shop,* v. 27, Sept. 1954, p. 158-160, 162-164.

Specific case illustrates design, construction and additional objectives realized from arc-welded design. Photographs, diagram. (K1, ST)

655-K. The Application of Lock Joints to Sheet Metal Work. W. Cookson. *Sheet Metal Industries,* v. 31, no. 329, Sept. 1954, p. 725-728, 737.

Applications and advantages of various types of mechanical joints. Diagrams. (K13)

656-K. Testing of Solder Fluxes. P. M. Fisk. *Sheet Metal Industries,* v. 31, no. 329, Sept. 1954, p. 743-745, 747.

Evaluation of various tests. 8 ref. (K7)

657-K. Compressed Glass-to-Metal Seals. H. Adam. *Society of Glass Technology, Journal,* v. 38, no. 182, June 1954, p. 285T-296T + 1 plate.

Theoretical and practical concepts regarding the compression factor. Diagrams, graphs, photographs. 6 ref. (K11)

658-K. Porosity in Low Carbon Steel Tungsten Inert Arc Welds. A. J. Rosenberg and B. Townshend. *Steel Processing,* v. 40, Sept. 1954, p. 569-571.

Factors contributing to porosity and methods of avoidance. Tables. graphs. (K1, K9, CN)

659-K. Resistance Welding Developments at Vauxhall Motors. II. *Welding and Metal Fabrication,* v. 22, Aug. 1954, p. 302-308.

Design and operations of welding assembly lines. Photographs, diagrams. (K3)

660-K. Directory of Welding and Fabricating Equipment. III. Hardfacing Electrodes. *Welding and Metal Fabrication,* v. 22, Aug. 1954, p. 319-322.

Tables covering equipment used by several British concerns. Tables. (K general, A10)

661-K. Modern Developments in the Design and Manufacture of Welded Pressure Vessels. M. B. Hamilton and J. McIntyre. *Welding and Metal Fabrication,* v. 22, Sept. 1954, p. 344-348.

Inspection of material, welding, fabrication and final inspection routines. Photographs. (To be continued.) (K general, CN)

662-K. The Spot Welding of Aluminium Alloys. H. E. Dixon. *Welding and Metal Fabrication,* v. 22, Sept. 1954, p. 350-353.

Improvements in machines and results of recent research. Graphs, diagrams, table. 17 ref. (To be concluded.) (K3, Al)

663-K. (German.) **Critical Consideration on the Tinning of Aluminum With the Aid of Ultrasound.** Rolf Göbel. *Nachrichtentechnik,* v. 4, no. 7, July 1954, p. 325-329.

Design and operation of ultrasonic soldering equipment, effects of fluxes and additions to the tin on quality of soldered joint. Diagrams, photographs. 8 ref. (K7, Al, Sn)

664-K. (Italian.) **Economic and Technical Comparison Between Oxy-Acetylene and Electric Welding of Light Alloys in Inert Gas.** P. Provenzali. *Alluminio,* v. 23, no. 4, 1954, p. 377-390.

Techniques, equipment, costs and advantages of each method. Tables, photographs. (K1, K2, Al)

665-K. Fusion-Welding of Titanium. H. D. Justis and L. Barnett. *Aviation Age,* v. 22, Sept. 1954, p. 76-79.

Gas-shielded arc welding using a nonconsumable tungsten electrode. Photographs, table. (K1, Ti)

666-K. The Application of Oxygen-Using Processes in Engineering. R. E. Doré. *Institute of Marine Engineers, Transactions (Supplement),* v. 66, Aug. 1954, p. 5-9.

Survey of use and capabilities of oxy-fuel gas flame in welding, cutting and treatment of metals. Photographs, table, graph. (K2, G17, J2)

667-K. Fasteners for High Temperature Service. John L. Everhart. *Materials & Methods,* v. 40, Sept. 1954, p. 104-106.

Problems encountered and recommended materials for use above 1200° F. Photographs, table. 6 ref. (K13, SG, AY)

668-K. Arc Weld Repairs on High Speed Tool Steel. Kenneth Rose. *Materials & Methods,* v. 40, Sept. 1954, p. 144-145.

Inert-gas-shielded arc welding used to rebuild and alter cutting tools extends their service life. Photographs. (K1, TS)

669-K. Manually Guided Submerged-Arc Welding. R. A. Kubli. *Welding Journal,* v. 33, Sept. 1954, p. 835-841.

Equipment, operation and comparison with manual coated electrode welding. Photographs, diagrams, tables. (K1)

690-K. Arc Welding Embrittlement of Powder Metals. Albert Sill, Jr. and C. C. Mathias. *Welding Journal,* v. 33, Sept. 1954, p. 842-846.

Investigation of embrittlement of powder metal due to effect of porosity and role of copper in iron-copper composition. Photographs, diagrams, tables, micrographs. 3 ref. (K1, H11, Fe, Cu, CN)

671-K. Iron Powder Electrodes and Their Application. Jerry Hinkel. *Welding Journal,* v. 33, Sept. 1954, p. 847-854.

Advantages of the rutile-plus iron powder type electrodes, properties, recommended techniques to get best results. Photographs, diagrams, graphs, tables. (K1, H11, Fe, ST)

672-K. The Development of Plant Welding Training Programs. Morris D. Thomas. *Welding Journal,* v. 33, Sept. 1954, p. 855-859.

Training methods used by General Motors for resistance welder maintenance men. Tables. (K3, A3)

673-K. Silver Brazing of Refractory Metals. C. H. Chatfield. *Welding Journal,* v. 33, Sept. 1954, p. 864-867.

Methods which may be used in overcoming difficulties in silver brazing aluminum-bronze, beryllium-copper, stainless steel, chromium carbide, molybdenum, titanium, zirconium and tantalum. 6 ref. (K8, Ag, Cu, SS, C-n, Cr, Mo, Zr, Ta)

674-K. Some Practical Considerations in the Application of Tungsten Arc Welding. H. A. Huff, Jr. *Welding Journal,* v. 33, Sept. 1954, p. 868-874.

Welding procedures for similar and dissimilar metals including type of gas, voltage, current, gas flow and speeds. Photographs, table. (K1)

675-K. Braze Welds Join Cast-Iron Conduit. P. B. Foster. *Welding Journal,* v. 33, Sept. 1954, p. 875-877.

Oxy-acetylene flame processes used in producing underground piping. Photographs. (K8, K2, CI)

676-K. Joining of Molybdenum. James H. Johnston, Harry Udin and John Wulff. *Welding Journal,* v. 33, Sept. 1954, p. 449S-458S.

Fusion welding, butt welding in air, brazing, spot welding and riveted joints. Tables, diagrams, photographs. 24 ref. (K general, Mo)

677-K. Thin Wall Ducting Poses Joining Problems. William M. Cattrell. *Western Metals,* v. 12, Sept. 1954, p. 58-59.

Fusion, resistance welding and brazing of high precision stainless steel tubing. Photographs. (K1, K2, K3, K8, SS)

678-K. (German.) **Contribution to the Diffusion Behavior of Noble Metal Platings.** W. Rienäcker and H. Spengler. *Metall,* v. 8, nos. 15-16, Aug. 1954, p. 615-618.

Pressure and diffusion welding of noble metals to brass to form electric contacts. Effect of various annealing times and temperatures. Photographs, micrographs, graphs, table. 3 ref. (K5, N1, J23, Cu, EG-c)

679-K. (German.) **Fundamentals of the Welding of Aluminum and Light-Metal Malleable Alloys.** E. Klosse. *Metall,* v. 8, nos. 17-18, Sept. 1954, p. 672-675.

Gas, arc, resistance and argon-shielded arc methods. Diagrams. 6 ref. (K2, K1, K3, Al, EG-a)

680-K. Induction Welding, Especially of Longitudinal Joints in Pipes, and Its Application. E. Hörmann. *Henry Brutcher, Altadena, Calif., Translation no.* 3338, 14 p. (From *Zeitschrift des Vereines Deutscher Ingenieure,* v. 96, no. 3, 1954, p. 65-72.)

Previously abstracted from original. See item 194-K, 1954. (K6)

681-K. (German.) **Cold-Pressure Welding and Cold-Pressure Soldering.** Wilhelm Hofmann and Klaus Groove. *Zeitschrift für Metallkunde,* v. 45, no. 8, Aug. 1954, p. 514-515.

Comparison of methods. Joining steel and aluminum and cold soldering aluminum and lead. Diagrams. 1 ref. (K5, K7, ST, Al, Pb)

682-K. (Russian.) **Welding of Crack in Bottom of High-Pressure Boiler Drum.** B. B. Solov'ev. *Energetik,* v. 2, no. 8, Aug. 1954, p. 9-11.

Prewelding treatment and temperature control methods. Graph, table, diagrams. (K general, AY)

683-K. (Book.) **Resistance Welding in Mass Production.** A. J. Hipperson and T. Watson. The Louis Cassier Co., Ltd., Dorset House, Stamford Street, London, S.E. 1, England. 21s.; postpaid 21s. 7d.

First principles of each process and its scientific application in mass production, with emphasis on design and production requirements. (K3)

L

Cleaning, Coating and Finishing

827-L. Some Influences of Carbon in Enameling of Steel. G. P. K. Chu, J. K. Magor and H. M. Davis. *American Ceramic Society, Journal,* v. 37, Sept. 1954, p. 391-401.

Vacuum system for extraction and analysis of gases. Diagrams, tables, micrographs. 17 ref. (L27)

828-L. On the Thermodynamics of Electrodes. T. G. Owe Berg. *Applied Scientific Research,* v. 4, sec. A, nos. 5-6, 1954, p. 414-420.

Second law as applied to irreversible processes. Tables. 4 ref. (L17, P12)

829-L. **Effect of Rapid Cathode Rotation and Magnetic Fields on Crystal Orientation in Electrodeposited Metals.** Ling Yang. *Electrochemical Society, Journal,* v. 101, Sept. 1954, p. 456-460.

Crystal orientations in metals electrodeposited on a cathode rotating at 3000 r.p.m. studied by electron diffraction; results were compared with those on a stationary cathode. It was found that orientation could be destroyed, changed to another type, or remain unchanged. Table, photographs, diagram. 22 ref. (L17, N5, P16, Ni, Fe, Ag, Cu, Sb)

830-L. **Determination of Barrier Layer Thickness of Anodic Oxide Coatings.** M. S. Hunter and P. Fowle. *Electrochemical Society, Journal,* v. 101, Sept. 1954, p. 481-485.

Studies of the evolution of the barrier layer during the early stages of the formation of a porous type coating on aluminum. Diagrams, graphs, table. 6 ref. (L19, Al)

831-L. **Hard Anodising of Aluminium and Its Alloys.** A. W. Brace. *Electroplating and Metal Finishing,* v. 7, Sept. 1954, p. 329-334.

Processes, details of practical operation and variations of coating properties. Graphs, diagram. (To be continued.) (L19, Al)

832-L. **Engineering Applications of Barrel Finishing.** *Electroplating and Metal Finishing,* v. 9, Sept. 1954, p. 339-340.

Equipment, processing and applications. Photographs, diagram, graph, micrographs. (L10)

833-L. **Electrolytic Derusting. Principles and Application of the Process.** L. Kenworthy and T. F. East. *Engineering,* v. 178, Aug. 20, 1954, p. 235-237.

An *in situ* process using sea-water electrolyte. (L13, ST)

834-L. **Enamel Finishes.** W. T. Ebel. *Foundry Trade Journal,* v. 97, Sept. 2, 1954, p. 275-276.

Recent developments in use and application of enamels on steel and cast iron. (L27, CN, CI)

835-L. **Galvanizing Pot Handles Structural Iron up to 46 Ft. Long.** R. E. Long. *Industrial Gas,* v. 33, Sept. 1954, p. 12-13.

Twenty-foot temporary extension on 26-ft. permanent pot allows steel girders up to 46 ft. long to be zinc coated in one trip. Photographs. (L16, CN, Zn)

836-L. **Metallizing Solves Wear Problem.** Don Borden. *Industry and Power,* v. 67, Sept. 1954, p. 72-73.

Paper mill digesters are metallized with type 304 stainless. Photographs. (L15, SS)

837-L. **Defects in Vitreous-Enamelled Iron Castings.** E. R. Evans. *Institute of British Foundrymen, Paper no.* 1096, 1954, 12 p.

Causes of defective enamel coatings, mechanism of blister gas formation and possibilities of eliminating various defects. Micrographs, diagrams, table. 6 ref. (L27, CI)

838-L. **Custom-Built Plating Machine Brings Plant to Peak Efficiency.** J. J. Obrzut. *Iron Age,* v. 174, Sept. 23, 1954, p. 120-122.

Features of automatic machine for chromium plating of automotive parts. Photographs, diagram. (L17, Cr)

839-L. **Statistical Quality Control for the Plater.** Joseph B. Kushner. *Metal Finishing,* v. 52, Sept. 1954, p. 64-68.

Principles and practical applications. Graphs. 5 ref. (L general, S12)

840-L. **Getting the Most for Your Polishing Dollar?** Edwin F. Doyle. *Metal Finishing,* v. 52, Sept. 1954, p. 69-70.

Factors contributing to efficient operation. (L10, L12)

841-L. **Plating in the Automotive Industry: Its History and Development.** William M. Phillips. *Metal Finishing,* v. 52, Sept. 1954, p. 76-79, 85.

Plating specifications and quality tests. Tables. (L general, S22, S12)

842-L. **Hot Dip Galvanizing.** *Metal Industry,* v. 85, Aug. 13, 1954, p. 129-130.

Includes "Thermal Factors Affecting Output in Sheet and Strip Galvanizing", J. Landeau and "An Italian Design for an Improved Galvanizing Furnace", A. Celli. (L16)

843-L. **Automatic Zinc Plating.** C. E. Fisher and D. F. Zlatnik. *Metal Progress,* v. 66, Sept. 1954, p. 107-112.

Equipment and techniques for plating steel for cartridge cases. Photographs, table, diagram. (L17, Zn, CN)

844-L. **Vitreous Enameling Keeps Pace With Production Practices.** (Digest of "Porcelain Enamel: Its Use and Manufacture for Household Appliances", by Wilbur H. Pfeiffer; *General Motors Engineering Journal,* v. 1, no. 6, May-June 1954, p. 8-13.) *Metal Progress,* v. 66, Sept. 1954, p. 146, 148, 150.

Composition, application and properties of porcelain coatings. (L27, CN)

845-L. **How to Paint Aluminum.** *Modern Metals,* v. 10, Sept. 1954, p. 42 + 5 pages.

Proper procedures and materials for decorative and protective coatings. Photographs, flow chart. (L26, Al)

846-L. **Some Considerations of Importance in Ball Burnishing.** Arthur S. Kohler. *Plating,* v. 41, Sept. 1954, p. 1013-1017.

Various factors of material importance in determining final quality of work. Photographs, diagrams. (L10)

847-L. **Nickel Plating From the Sulfamate Bath.** Richard C. Barrett. *Plating,* v. 41, Sept. 1954, p. 1027-1032; disc., p. 1033.

Desirable physical properties account for increase in use of process. Tables, graphs. 29 ref. (L17, Ni)

848-L. **An Electrochemical Method for Evaluating Plated Coatings.** W. J. Pierce and W. L. Pinner. *Plating,* v. 41, Sept. 1954, p. 1034-1042; disc., p. 1042.

Investigation to discover points of potential plate failure, to indicate fundamental nature of service corrosion of a noble metal electrodeposit and to improve quality. Photographs, diagrams, graphs, micrographs. 2 ref. (L17)

849-L. **Silicone Enamels: New Coatings for Zinc Base Die Castings.** Lynn Sprague. *Precision Metal Molding,* v. 12, Sept. 1954, p. 83-89.

Application, defects, baking and salvaging of rejects. Photographs. (L27, Zn)

850-L. **Mechanical Properties of Aluminum Hard Coatings.** Henry A. Johnson. *Product Engineering,* v. 25, Sept. 1954, p. 136-141.

Increased hardness and wear resistance reduce fatigue resistance and tensile strength, thereby influencing design. Photographs, tables, graphs. (L general, Q general, Al)

851-L. **Cures for Faults in Electroplating. I. Copper Plating Troubles.** H. Prince. *Product Finishing,* v. 7, Aug. 1954, p. 54-56.

Table outline of defects, possible cause and suggested remedies for the cyanide copper bath. Tables. (L17, Cu)

852-L. **Paint Film Defects and Their Remedies. V. Frosting: Wrinkling.** H. J. Testro. *Product Finishing,* v. 7, Aug. 1954, p. 61-65.

Review of types of paint film failures. Photographs. (L26)

853-L. **Technical Problems in the Finishing Shop. Care of the Etch Primer.** E. E. Halls. *Product Finishing,* v. 7, Aug. 1954, p. 66-70, 122.

Formulation, advantages and applications. 2 ref. (L general)

854-L. **Agricultural Machinery Finishes.** *Product Finishing,* v. 7, Aug. 1954, p. 77-80.

Finishing arrangements and refinishing methods. Photographs. 1 ref. (L general)

855-L. **Laboratory-Scale Simulation of the Electro-Tinplate Manufacturing Process.** R. Mills and C. J. Thwaites. *Sheet Metal Industries,* v. 31, no. 329, Sept. 1954, p. 733-737.

Equipment and techniques for study of plating problems. Photographs, diagram. 7 ref. (L17, Sn)

856-L. **Push-Button-Controlled Rotary Coiled-Strip Pickling.** E. W. Mulcahy. *Sheet Metal Industries,* v. 31, no. 329, Sept. 1954, p. 738-739, 741.

Details of new installation. Photographs. (L12, ST)

857-L. **Some Properties of Vitreous Enamels and Their Practical Significance.** H. Laithwaite. *Sheet Metal Industries,* v. 31, no. 329, Sept. 1954, p. 775-780.

Factors in selection of frit, theoretical principles. Tables, graph. (L27)

858-L. **Vapor Degreasing Earns Its Keep.** P. R. Hendrixson. *Steel,* v. 135, Sept. 13, 1954, p. 124-126.

Factors to consider in installing metal cleaning facilities, advantages, costs and future. Photographs. (L12)

859-L. **What Do You Know About Power Brushing? I.** James H. Heroy, Jr. *Steel Processing,* v. 40, Sept. 1954, p. 565-568, 592.

Factors in selection of brushes for various cleaning operations. Photographs. (L10)

860-L. **Heat Aging Characteristics of Insulating Varnishes.** H. I. Morgan and K. N. Mathes. *Wire and Wire Products,* v. 29, Sept. 1954, p. 967, 970-973.

Characteristics of varnishes used to protect, insulate and bond wires in electrical equipment. Tables, graphs. 3 ref. (L27, Cu)

861-L. **Silicone Insulated Cable Practice.** H. T. Armitt. *Wire and Wire Products,* v. 29, Sept. 1954, p. 978-981.

Application and properties of coating for copper wire. Graphs. (L26, Cu)

862-L. (German and French.) **"Granal", a New Blasting Agent for Surface Treatment of Aluminum Parts.** Hans P. Häberlin and Hans Keller. *Aluminium Suisse,* v. 4, no. 4, July 1954, p. 136-137.

A metallic granulated substance replaces the sand in sand-blasting and its advantages. Table, photograph. (L10, Al)

863-L. (German.) **Structure of Zinc Coatings Based on Electrochemical Removal.** Walter Katz. *Archiv für das Eisenhüttenwesen,* v. 25, nos. 7-8, July-Aug., 1954, p. 307-314.

Accurate electrochemical method of determining thickness and phases of zinc coatings applied by hot dipping. Diagrams, micrographs, graphs. 16 ref. (L16, Zn)

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Chemical testing for qualitative evaluation. Diagrams, tables, photograph. 3 ref. (L27, Al)

866-L. (German.) Repair Welding of Chilled Cast Iron Rolls. Heinz Becker. *Stahl und Eisen*, v. 74, no. 18, Aug. 26, 1954, p. 1136-1140; disc., p. 1140-1142.

Most successful method involves use of ferritic and austenitic weld metal. Photographs, micrographs, graphs. (L24, CI, SS)

867-L. (German.) Repair of Gray and Chilled Cast Iron Rolls by Welding. Karl Scholl. *Stahl und Eisen*, v. 74, no. 18, Aug. 26, 1954, p. 1142-1144.

Repair of worn roll necks by deposition welding. Photographs, diagrams. 2 ref. (L24, CI)

868-L. (German.) Refacing of Steel Rolls by Welding. Heinz Becker. *Stahl und Eisen*, v. 74, no. 18, Aug. 26, 1954, p. 1144-1156; disc., p. 1156-1159.

Causes of failures in deposition welding and costs of method. Photographs, graphs, diagrams, tables. 4 ref. (L24, ST)

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Review of literature on repair welding. Photographs, table, diagrams, graph. 16 ref.
(K general, L24, F23)

870-L. Why Porcelain-Enamel Aluminum? B. G. Bricker. *Materials & Methods*, v. 40, Sept. 1954, p. 107.

Ceramic coating contributes properties not otherwise attainable. Photograph. (L27, Al)

871-L. Effluents in the Metal Finishing Industries. V. Evans. *Metal Industry*, v. 85, Sept. 10, 1954, p. 211-214.

Types, treatment and disposal of effluents. Photographs. 7 ref.
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Flat transducer, driven at high power density but at lower frequencies, has many advantages. Photographs, diagram. (L10)

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Replica finishing or coating processes eliminated. Final mirror coatings prepared directly on master mold. Method applicable to plastic and electroformed metal reproductions. Diagrams. 4 ref. (L18)

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Principle and formulation of zinc chromate as a rust inhibitive pigment. (L14, ST)

875-L. Methods of Reclaiming Excavator Bucket Teeth. *Welder*, v. 23, Apr.-June 1954, p. 150-151.

Materials and techniques for efficient salvage operation. Photographs, diagrams. (L24, A8, AY)

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Advantages over electroplating for certain applications. Photographs. (L25)

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Procedure of electroplating to increase wear resistance of printing rolls. Table. (L14, Cr)

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Equipment and operating procedures for continuous process. Diagrams, photograph. 16 ref.
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Limits of anodic passivation of pure aluminum and aluminum-magnesium alloys. Graphs, tables. 5 ref. (L19, R10, Al, Mg)

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Electrodeposition of carbonate, oxide or ceramic particles from a suspensoid for coating radio tube filaments and cathodes. Diagrams, graph, photographs. 2 ref. (L17)

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(L15, Be, ST)

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M

Metallography, Constitution and Primary Structures

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Guide for selection of best magnification. (M21)

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Binary alloys with up to 5.5 wt.% of silicon prepared by arc melting, and limits of solid solubility of silicon in titanium determined by micrographic examination of quenched specimens. Tensile and hardness tests were carried out at 650 and 800° C. Tables, diagrams, photographs, micrographs. 10 ref. (M24, Q27, Q29, Ti, Si)

387-M. (German.) **Contribution to the Zirconium-Silicon System and on Several Silicide-Mixture Systems.** Richard Kieffer, Friedrich Benesovsky and Rudolf Machenschalk. *Zeitschrift für Metallkunde*, v. 45, no. 8, Aug. 1954, p. 493-498.
Preparation of zirconium-silicon alloys by pressure and vacuum sintering. Determination of tentative constitution diagram by melting point, X-ray and metallographic studies. Hardness, density and scaling resistance of zirconium-silicon alloys. Miscibility and scaling resistance of ZrSi$_2$-TiSi$_2$ and ZrSi$_2$-VSi$_2$ systems. Tables, graphs. 32 ref. (M24, Q29, P10, Zr, Si, Ti, V)

388-M. (Russian.) **X-Ray Investigation of Nitrided Layer of Carbon and Alloy Steels.** M. I. Fuks and E. V. Aronson. *Zhurnal Tekhnicheskoi Fiziki*, v. 24, no. 8, Aug. 1954, p. 1448-1454.
Structures of nitrided steels, effects of alloys on hardness and formation of epsilon phase. Graphs, X-ray patterns. 10 ref. (M27, N6, Q29, CN, AY)

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Fundamentals of specimen history and etching treatment, testing machines and devices, and optics of microscopy. (M21)

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385-N. How to Understand Annealing and Hot Working of Metals. Samuel Storchheim. *American Machinist*,

v. 98, Sept. 13, 1954, p. 161-168.

Recrystallization, grain and secondary grain growth, factors affecting recrystallization, warpage, atom alignment, effect of temperature and failure at high temperature. Micrographs, graphs, tables. (N5, N3, J23)

386-N. Accelerated Strain Aging of Mild Steel. B. B. Hundy. *Iron and Steel Institute, Journal,* v. 178, Sept. 1954, p. 34-38.

Relation of room temperature aging time and time at elevated temperatures. Experimental conformation up to 200° C. Graphs, tables. 15 ref. (N7, CN)

387-N. The State of the Carbon in Austenite and Martensite as Revealed by the Eggertz Test. F. C. Thompson and A. R. Chaudhuri. *Iron and Steel Institute, Journal,* v. 178, Sept. 1954, p. 44-50.

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Thermodynamics and nucleation theories. Solid solutions. Reaction kinetics. Age hardening alloys. Graphs, micrographs, spectra, phase diagrams, tables. 350 ref. (N12, P12)

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Principles and theories of solidification of ingots and castings. Substructures. Effects of impurities. Diagrams, graphs, micrographs, photographs, tables. 55 ref. (N12)

391-N. (French.) Contribution to the Radio-Crystallographic Study of Allotropic Transformations Induced by Pressure. Louis Guengant and Boris Vodar. *Comptes rendus,* v. 239, no. 5, Aug. 2, 1954, p. 431-433.

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Resistance temperature anomaly of a Zn-Sb alloy with 57.7% Sb at −10 to −20° C. explained as a phase transformation of the beta Zn_4Sb_3 crystal. Graphs, table. 8 ref. (N6, Zn, Sb)

396-N. (German.) Tellurium Monocrystal According to the Czochralski Process. J. Weidel. *Zeitschrift für Naturforschung,* v. 9a, nos. 7-8, July-Aug. 1954, p. 697.

Method of growing tellurium crystals. Photograph. 6 ref. (N12, Te)

397-N. Conditions for Dendritic Growth in Alloys. W. Morris, W. A. Tiller, J. W. Rutter and W. C. Winegard. *American Society for Metals, Transactions,* v. 47, *Preprint No.* 17, 1954, 9 p.

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Theoretical treatment of strain energy and compound formation. Explains directions of the solvus lines. Graphs, table. 8 ref. (N12, P12)

399-N. Further Study of Microstructural Changes on Tempering Iron-Carbon Alloys. B. S. Lement, B. L. Averbach and Morris Cohen. *American Society for Metals, Transactions,* v. 47, *Preprint No.* 21, 1954, 26 p.

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Cold work below a definite critical amount has little effect or may retard sigma formation. Tables, graphs, micrographs. 5 ref. (N5, N6, SS)

402-N. The Laves and Chi Phases in a Modified 12 Cr Stainless Alloy. F. L. VerSnyder and H. J. Beattie, Jr. *American Society for Metals, Transactions,* v. 47, *Preprint No.* 28, 1954, 18 p.

Tests on series of heats with various titanium additions show formation of Chi-phase increases with titanium content. Tables, micrographs, diagram. 17 ref. (N6, SS)

403-N. Secondary Graphitization of Quenched and Tempered Ductile Cast Iron. J. C. Danko and J. F. Libsch. *American Society for Metals, Transactions,* v. 47, *Preprint No.* 32, 1954, 12 p.

Metallographic studies show increased silicon results in more secondary graphite. Table, micrographs. 13 ref. (N8, CI)

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Binary alloys with up to 5.5 wt.% of silicon prepared by arc melting, and limits of solid solubility of silicon in titanium determined by micrographic examination of quenched specimens. Tensile and hardness tests were carried out at 650 and 800° C. Tables, diagrams, photographs, micrographs. 10 ref. (M24, Q27, Q29, Ti, Si)

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Tests on series of heats with various titanium additions show formation of Chi-phase increases with titanium content. Tables, micrographs, diagram. 17 ref. (N6, SS)

403-N. Secondary Graphitization of Quenched and Tempered Ductile Cast Iron. J. C. Danko and J. F. Libsch. *American Society for Metals, Transactions,* v. 47, *Preprint No.* 32, 1954, 12 p.

Metallographic studies show increased silicon results in more secondary graphite. Table, micrographs. 13 ref. (N8, CI)

404-N. A Method for Determining the Continuous Cooling Transformations in Steel. R. D. Chapman and W. E. Jominy. *American Society for Metals, Transactions,* v. 47, *Preprint No.* 33, 1954, 16 p.

Equipment and techniques for magnetic testing. Test data for four alloy steels. Diagrams, graphs, tables. 9 ref. (N8, M23, AY)

405-N. Transformation in a Titanium-Chromium Alloy. H. M. Otte. *Nature,* v. 174, Sept. 11, 1954, p. 506.

Effect of deformation on structure of alloy containing 90% titanium and 10% chromium. 3 ref. (N6, Q24, Ti)

406-N. The Diffusion of Carbon in Alpha Iron. W. R. Thomas and G. M. Leak. *Philosophical Magazine,* v. 45, 7th ser., no. 368, Sept. 1954, p. 986-987.

Determination of diffusion coefficients at 0-100° C. Graph, table. 3 ref. (N1, Fe)

407-N. (English.) On the Thermostatic Treatment of High Speed Steel and the Behavior of the Residual Austenite. Sadao Koshiba, Kazuo Tanaka and Asao Inada. *Hitachi Review,* 1954, no. 6, July, p. 135-142.

Behavior of residual austenite in low-tungsten high speed steel, in regard to the effects of different hot bath temperatures and holding times on Ar″ transformation, magnetic saturation strength, the heat expansion curve during isothermal treatment and changes following low-temperature treatment. Graphs, table. 2 ref. (N8, TS)

408-N. (Russian.) Problem of Temperature of Start of Transformation of Pearlite Into Austenite During Rapid Heating. D. M. Gurevich. *Zhurnal Tekhnicheskoi Fiziki,* v. 24, no. 7, July 1954, p. 1268-1272.

Experimental techniques. Effects of spot welding thermocouples to the specimen. Graph, diagram, oscillograms. 17 ref. (N8, ST)

409-N. Graphite Formation in Cast Iron Inoculated With Magnesium. K. P. Bunin and Y. N. Taran. *Henry Brutcher, Altadena, Calif., Translation no.* 3352, 6 p. (From *Doklady Akademii Nauk SSSR,* v. 94, no. 6, 1954, p. 1061-1063.)

Previously abstracted from original. See item 214-N, 1954. (N8, CI, Mg)

410-N. Mechanism of Action of Silicon Upon Graphitization of Iron Alloys. K. P. Bunin. *Henry Brutcher, Altadena, Calif., Translation no.* 3353, 7 p. (From *Doklady Akademii Nauk SSSR,* v. 95, no. 1, 1954, p. 97-100.)

Previously abstracted from original. See item 199-N, 1954. (N8, Fe, Si)

411-N. On the Cooling Curve of Spheroidal Graphite Cast Iron. A. Wittmoser. *Henry Brutcher, Altadena, Calif., Translation no.* 3358, 9 p. (Condensed from *Archiv für das Eisenhüttenwesen,* v. 24, nos. 9-10, 1953, p. 431-434.)

Previously abstracted from original. See item 23-N, 1954. (N8, J general, CI)

412-N. (French.) On Secondary Hardening in a Chromium-Molybdenum Steel. L. Habraken. *Revue de métallurgie,* v. 51, no. 8, Aug. 1954, p. 541-550; disc., p. 550.

Studies of 2.25% chromium, 1% molybdenum steel. Secondary hardening occurs due to transformation of austenite into ferrite and carbide, and to a structural hardening connected with the formation of a special carbide (phase X). Micrographs, graph, diagrams, table. (N8, Q29, AY)

413-N. (German and French.) **Diffusion Processes in Welding Technique.** Carl G. Keel. *Zeitschrift für Schweisstechnik*, v. 44, no. 9, Sept. 1954, p. 187-192.

Structure of metals, principle of diffusion, diffusion constants, theory of alloy formation, self-diffusion and contact reactions between solid metals. Diagrams, graphs, table. (To be continued.) (N1, K general)

414-N. (German.) **Morphology of the Chemical and Physical Disintegration of Zinc and Cadmium Monocrystals.** Sigmar German. *Zeitschrift für Metallkunde*, v. 45, no. 8, Aug. 1954, p. 484-489.

Procedure of growing crystals and disintegrating them by etching in solutions and hydrogen chloride vapor and by varporizing in high vacuum. Diagram, photographs, tables, micrographs. 13 ref. (N12, Zn, Cd)

415-N. (German.) **Texture Investigations on Wires. I. Deformation and Recrystallization Textures of Brass, Copper, and Silver. II. Effect of Alpha-Beta Transformation of Brass on Texture.** Johanna Grewen and Günter Wassermann. *Zeitschrift für Metallkunde*, v. 45, no. 8, Aug. 1954, p. 498-508.

Deformation and heat treatment of extruded and rolled wires, formation of deformation textures, explanation of recrystallization textures and relationship of orientation of alpha and beta phases in brass. Tables, X-ray photographs, micrographs, graph. 24 ref. (N5, Q24, Cu, Ag)

416-N. (Russian.) **Phenomena of Diffusion in Metals and Alloys.** B. I. Pines. *Zhurnal Tekhnicheskoi Fiziki*, v. 24, no. 8, Aug. 1954, p. 1521-1540.

Mathematical treatment of kinetics of external and internal diffusion, recrystallization. 10 ref. (N1, N5)

P

Physical Properties and Test Methods

534-P. Thermal Conductivity. XI. Conductivity of Some Refractory Carbides and Nitrides. T. Vasilos and W. D. Kingery. *American Ceramic Society, Journal*, v. 37, Sept. 1954, p. 409-414.

Thermal conductivity of TiC, SiC, TiN and ZrN measured in temperature range 100 to 1000° C. Thermal conductivity decreased with increasing temperature. Graphs, tables, diagrams. 15 ref. (P11, H general, C-n)

535-P. Thermal Diffusivity of Metals at High Temperatures. D. Rosenthal and N. E. Friedmann. *Journal of Applied Physics*, v. 25, Aug. 1954, p. 1059-1060.

New technique and experimental data. 8 ref. (P11, Cu, Al)

536-P. On the Heats of Sublimation and Evaporation of Germanium. Richard E. Honig. *Journal of Chemical Physics*, v. 22, Sept. 1954, p. 1610.

Four species of germanium measured from 1100 to 1500° K. Diagrams, table. 7 ref. (P12, Ge)

537-P. Speculations on the Energy Band Structures of Ge-Si Alloys. Frank Herman. *Physical Review*, v. 95, ser. 2, Aug. 1, 1954, p. 847-848.

Relation between optical energy gap and composition. Diagrams. 6 ref. (P17, Ge, Si)

538-P. Temperature Variation of the Mean Debye Temperature of Cu_3Au, 20° C to 450° C. S. L. Quimby. *Physical Review*, v. 95, ser. 2, Aug. 15, 1954, p. 916.

Values calculated from crystalline Cu_3Au at equilibrium order from elastic constants. Table. 6 ref. (P12, Cu, Au)

539-P. Thermoelectric Power and Electron Scattering in Metal Alloys. C. A. Domenicali and F. A. Otter. *Physical Review*, v. 95, ser. 2, Sept. 1, 1954, p. 1134-1142.

Empirical study of binary alloys of copper, silver, gold, alkali metals and aluminum. Graphs. 32 ref. (P15, EG-e, Cu, Ag, Au, Al)

540-P. (German.) **Increase of the Magnetic Permeability of Iron-Silicon and Iron-Aluminum Alloys by Low-Temperature Annealing in an Oxidizing Atmosphere.** Hermann Fahlenbrach and Eduard Houdremont. *Archiv für das Eisenhüttenwesen*, v. 25, nos. 7-8, July-Aug. 1954, p. 377-381.

Effect of annealing time and furnace atmosphere. Graphs, tables, micrograph. 14 ref. (P16, J23, Si, Al, Fe)

541-P. The Thermodynamic Approach to Solid Structure. Vera Daniel. *British Journal of Applied Physics*, v. 5, Sept. 1954, p. 305-311.

Demonstrates advantages of thermodynamic methods for treatment of solids. Examples show that a clear understanding of what is thermodynamically possible can save a good deal of misunderstanding, and that measurement of thermodynamic data in some cases makes it possible to predict properties of materials where other methods are unwieldy or impracticable. Table, graphs, diagrams. 11 ref. (P12, Al, Cu)

542-P. Methods for Studying the Thermal Resistances of Sprayed and Electrodeposited Metal Coatings. R. W. Powell and M. J. Hickman. *British Journal of Applied Physics*, v. 5, Sept. 1954, p. 312-315.

Two methods for investigating additional thermal resistance introduced when plane end of a metal bar is coated with sprayed steel or an electrodeposited metal. Diagrams, graph, tables. 6 ref. (P11, L23, L17)

543-P. Temperature-Dependent de Haas-van Alphen Parameters in Zinc. Ted G. Berlincourt and M. C. Steele. *Physical Review*, v. 95, ser. 2, Sept. 15, 1954, p. 1421-1428.

Magnetic susceptibility of single crystal of zinc investigated from 4.2 to 300° K. in fields up to 25 kilogauss. Traces of the de Haas-van Alphen effect persisted at temperatures as high as 200° K. Graphs. 25 ref. (P16, Zn)

544-P. The Thermal Conductivity of Germanium and Silicon at Low Temperatures. H. M. Rosenberg. *Physical Society, Proceedings*, v. 67, no. 417A, Sept. 1954, p. 837-840.

Determinations at 2 to 100° K. Graphs. 8 ref. (P11, Ge, Si)

545-P. The Calculation of Heats of Formation of Binary Alloys. J. H. O. Varley. *Philosophical Magazine*, v. 45, 7th ser., no. 368, Sept. 1954, p. 887-916.

Theoretical treatment for calculating heats of formation of binary alloys for any composition. Diagram, tables, graphs. 17 ref. (P12)

546-P. Superconducting Elements. Julian Eisenstein. *Reviews of Modern Physics*, v. 26, July 1954, p. 277-291.

Magnetic and thermal properties of 21 metals. Tables. 74 ref. (P16, P11)

547-P. Thermionic Constants of Metals and Semiconductors. IV. Monovalent Metals. S. C. Jain and K. S. Krishman. *Royal Society, Proceedings*, v. 225, ser. A, Aug. 31, 1954, p. 159-172.

Detailed calculation of the effect of the thermal expansion of the lattice, and the increased thermal oscillations of the atoms in the lattice, associated with the rise in temperature, on the energy of the barrier at the surface. Diagram, tables. 15 ref. (P11, Cu, Ag, Au)

548-P. (French.) **Special Thermoelectric Elements.** Marcel Perrot and Georges Peri. *Comptes rendus*, v. 239, no. 7, Aug. 18, 1954, p. 537-539.

Studies of electromotive force obtained by compressing powdered aluminum, beryllium, and thorium oxides between two metallic plates. (P15, H14, Al, Be, Th)

549-P. Relationship Between Surface Tension of Liquid Chrome-Nickel Alloys and Some Properties in Their Solid State. O. S. Bobkova and A. M. Samarin. *Henry Brutcher, Altadena, Calif., Translation no.* 3373, 12 p. (From *Izvestiya Akademii Nauk SSSR, OTN*, 1954, no. 2, Feb., p. 52-59.)

Surface tension of liquid alloys in relation to hardness and impact values in the solid state after quenching or aging. Diagrams, graphs, tables. 2 ref. (P10, Q29, Q6, Cr, Ni)

550-P. (Russian.) **Temperature of Heating During Thermomagnetic Treatment of "Magnico" Alloy.** G. F. Golovin and A. A. Shekalov. *Zhurnal Tekhnicheskoi Fiziki*, v. 24, no. 8, Aug. 1954, p. 1503-1507 + 2 plates.

Magnetic properties and quenching temperature. Microstructures of tempered and untempered specimens. Graphs, micrographs. 4 ref. (P16, M27, J26, Fe, Co, Ni, Al, Cu)

Q

Mechanical Properties and Test Methods; Deformation

964-Q. Symmetrical Buckling of Right-Angled Isosceles Triangular Plates. W. H. Wittrick. *Aeronautical Quarterly*, v. 5, July 1954, p. 131-143.

Consideration of plates subjected to shear along the two perpendicular edges together with uniform compression in all directions. Tables, graphs. 3 ref. (Q28, Q2)

965-Q. Some Remarks on the Structural Analysis of Swept Wings. E. Terner. *Aircraft Engineering*, v. 26, Sept. 1954, p. 288-291.

Stress analysis method in which swept wings are treated as orthotropic sandwich plates. Diagrams. (Q25)

966-Q. The Strength of Tubular Struts. R. Prizeman. *Aircraft Engineering*, v. 26, Sept. 1954, p. 300-302.

Curves show compressive (flexural instability) strength of tubes made from steel and aluminum alloys. Graphs. (Q28, ST, Al)

967-Q. Research on Creep and Fracture at High Temperatures. A.

G. Thomson. *Aircraft Engineering*, v. 26, Sept. 1954, p. 308-309.

Review of work in England and U. S. 20 ref. (Q3, Q26)

968-Q. The Effect of Fluid Pressure on the Shear Properties of Metals. B. Crossland. *Chartered Mechanical Engineer*, v. 1, Sept. 1954, p. 343-345.

Effect of hydrostatic pressure on shear properties of mild steel, annealed copper, cold-worked copper, silicon-aluminum, high purity zinc and zinc-aluminum alloy. Graphs, diagram. 4 ref.
(Q2, CN, Cu, Si, Al, Zn)

969-Q. Machine Design for Cyclic Stress. J. S. Caswell. *Engineer*, v. 198, Sept. 3, 1954, p. 318-321.

Characteristics and effects of cyclic stressing, effects of stress concentration. New formula for use in cyclic stress design. Diagrams, graphs. 20 ref. (To be continued.) (Q25)

970-Q. Importance of the Correct Shape of the Diamond Hardness Indenter. K. Meyer. *Industrial Diamond Review*, v. 14, Aug. 1954, p. 167-169.

Errors caused by the indenter due to geometrical form, surface quality and seat of the diamond in its metallic socket. Micrographs. (Q29)

971-Q. A Study of Preferred Orientation in Extruded, Drawn, and Annealed Copper. Paul G. Bastien and J. Pokorny. *Institute of Metals, Journal*, v. 82, Aug. 1954, p. 545-549.

Influence of degree of working, added elements and annealing temperature after deformation. Connection between deformation and recrystallization textures. Diagrams, tables. 15 ref. (Q24, N5, Cu)

972-Q. The Cleavage Fracture of Pure Polycrystalline Zinc in Tension. G. W. Greenwood and A. G. Quarrell. *Institute of Metals, Journal*, v. 82, Aug. 1954, p. 551-560.

Effects of grain size, temperature, strain rate and plastic deformation on type of fracture and true fracture stress. Graphs, tables. 19 ref. (Q27, Q26, Zn)

973-Q. Preferred Orientation in Rolled Uranium Sheet. J. Adam and J. Stephenson. *Institute of Metals, Journal*, v. 82, Aug. 1954, p. 561-567.

Deformation texture as a mixture of grains is accurate for high temperature and high total rolling reduction. Diagrams, tables, graphs. 11 ref. (Q24, U)

974-Q. Some Effects of Hydrogen on the Delayed Fracture of High-Tensile Steel. Winifred A. Bell and A. H. Sully. *Iron and Steel Institute, Journal*, v. 178, Sept. 1954, p. 15-18.

Study of fracture under prolonged loading of 0.9% carbon steel which had been pickled. Griffith crack theory applied to results. Photograph, table. 11 ref. (Q26, CN)

975-Q. The Elasticity of an Isotropic Aggregate of Anisotropic Cubic Crystals. A. V. Hershey. *Journal of Applied Mechanics*, v. 21, Sept. 1954, p. 236-240.

Analysis of stress distributions in a polycrystalline cubic metal with isometric and randomly oriented crystalline grains. Tables, diagrams, graph. 51 ref. (Q21, M26)

976-Q. The Plasticity of an Isotropic Aggregate of Anisotropic Face-Centered Cubic Crystals. A. V. Hershey. *Journal of Applied Mechanics*, v. 21, Sept. 1954, p. 241-249.

Analysis of plastic deformation in terms of plasticity of individual grains. Tables, diagrams. 75 ref. (Q24, M26)

977-Q. Internal Friction and Dynamic Modulus of Cold-Worked Metals. A. S. Nowick. *Journal of Applied Physics*, v. 25, Sept. 1954, p. 1129-1134.

Nonlinear, Köster and viscosity effects. Table, graphs. 25 ref. (Q22)

978-Q. The Application of Membrane Analogy for the Determination of Torsional Ridigity of Non-Circular Solid Shafts. V. Cadambe and R. K. Kaul. *Journal of Scientific & Industrial Research*, v. 13, sec. B, July 1954, p. 455-461.

Applies soap film analogy. Torsion constant determined by "least squares" method. Diagrams, graphs, tables. 8 ref. (Q1)

979-Q. Brittle Failure of Steel Structures—a Brief History. M. E. Shank. *Metal Progress*, v. 66, Sept. 1954, p. 83-88.

Although 250 welded ships have been disabled since 1940 by brittle cracking, such failures began as soon as steel plate became available for structural use and include storage tanks, bridges, booms and long pipe lines. (Q23, Q26, ST)

980-Q. Relations Between the Elastic Moduli and the Plastic Properties of Polycrystalline Pure Metals. S. F. Pugh. *Philosophical Magazine*, v. 45, 7th ser., no. 367, Aug. 1954, p. 823-843.

Includes tables, graphs. 29 ref. (Q21, Q23)

981-Q. Computation of Initial Buckling Stress for Sheet-Stiffener Combinations. H. L. Cox. *Royal Aeronautical Society, Journal*, v. 58, Sept. 1954, p. 634-638.

Short survey of theory on which Structures Data Sheets are based and manner of application. 3 ref. (Q28)

982-Q. The Physical Meaning of Indentation Hardness. D. Tabor. *Sheet Metal Industries*, v. 31, no. 329, Sept. 1954, p. 749-757; disc., p. 757-763.

Physical concept of indentation process explains empirical relations in good agreement with observations. Graphs, tables, diagrams, photographs. 5 ref. (Q29)

983-Q. The Practical Testing of the Cohesive Strength and Weldability of Steels. W. A. Felix. *Sulzer Technical Review*, 1954, no. 1, p. 33-43.

Tensile, bending and notch-impact tests. Measuring hardening and embrittlement in the heat affected zone of a single-pass weld bead. Diagrams, photographs, graphs, micrographs. (Q23, K9, ST)

984-Q. Bending Tests on Box Beams Having Solid and Open-Construction Webs. Aldie E. Johnson, Jr. *U. S. National Advisory Committee for Aeronautics, Technical Note* 3231, Aug. 1954, 25 p.

Studies effects of replacing alternate webs by open, post-stringer construction. Photographs, tables, graphs, diagrams. 8 ref. (Q5)

985-Q. The Fracture of Metals. N. J. Petch. Paper from "Progress in Metal Physics", v. V, Interscience Publishers, Inc., p. 1-52 + 3 plates.

Principles, types, stress systems, thermodynamic theories. Graphs, tables, diagrams, photographs. 183 ref. (Q26)

986-Q. Geometrical Aspects of the Plastic Deformation of Metal Single Crystals. R. Maddin and N. K. Chen. Paper from "Progress in Metal Physics", v. V, Interscience Publishers, Inc., p. 53-95 + 10 plates.

Slip bands, kink bands and glide planes. Diagrams, micrographs, tables. 128 ref. (Q24)

987-Q. (German and French.) **New Fatigue-Testing Installation of the Research Institute of the Aluminum Industry Co. in Neuhausen.** E. von Burg. *Aluminium Suisse*, v. 4, no. 4, July 1954, p. 140-141.

Equipment for testing whole construction parts. Photographs. (Q7, Al)

988-Q. (German.) **Correlation Between Microhardness and Macrohardness.** Werner Schultze and Ludwig Schimmer. *Archiv für das Eisenhüttenwesen*, v. 25, nos. 7-8, July-Aug. 1954, p. 337-339.

Kick's law of similarity and Meyer's exponential function, establishment of Meyer's straight-line curve from Vickers microhardness measurements at loads of 10-3000 grams and computation of macrohardness by extrapolation to higher loads. Graphs, tables, micrograph. 6 ref. (Q29)

989-Q. (German.) **Correlation Between Micro and Macro-Hardness of Ferrite and Aluminum Crystals.** Alexander Schepers and Werner Bartholome. *Archiv für das Eisenhüttenwesen*, v. 25, nos. 7-8, July-Aug. 1954, p. 341-343.

Comparison of extrapolated with measured values shows that extrapolation of microhardness, into the range of macrohardness, yields useful values. Tables, graphs. 3 ref. (Q29, Fe, Al)

990-Q. (German.) **Conditions for the Initiation and Extension of Brittle and Deformation Fracture on the Basis of the Characteristics of Dislocations. I. Stability Limits Between Displacement Orientation and Holes. II. Formation and Expansion of Cracks to the Point of Fracture and Effect of Temperature, Rate of Stressing, and State of Stress.** Albert Kochendörfer. *Archiv für das Eisenhüttenwesen*, v. 25, nos. 7-8, July-Aug. 1954, p. 351-372.

Review of literature and theoretical discussion. Diagrams, tables, graphs. 119 ref. (Q24)

991-Q. (Polish.) **Tests of Zinc and Aluminum-Base Bearing Alloys.** S. Balicki. *Prace Instytutow Ministerstwa Hutnictwa*, v. 6, no. 3, 1954, p. 142-148.

Tests show zinc-aluminum-copper alloys to be good substitutes for usual bearing alloys containing large amounts of tin. Tables, graphs, micrographs. 7 ref.
(Q9, T7, Zn, Al, Sn)

992-Q. (Russian.) **Resistance to Wear of Metallic Alloys During Grinding of Glass.** Ia. N. Malinochka. *Steklo i Keramika*, v. 11, no. 8, Aug. 1954, p. 14-23.

Wear resistance of aluminum alloy, cast iron and steel polishing wheels during abrasive grinding and polishing of glass. Tables, micrographs. (Q9, CN, Al, CI)

993-Q. The Tensile Characteristics of Unalloyed Zirconium at Low and Moderate Temperatures. J. H. Keeler. *American Society for Metals, Transactions*, v. 47, *Preprint No.* 5, 1954, 33 p.

Effects of strain rate, test temperature, grain size, preferred orientation and amounts of oxygen and nitrogen on strength properties. Tables, diagram, graphs, micrographs. 9 ref. (Q27, Zr)

994-Q. The Effect of Prestraining Under Different Stress States on the Fracture and Flow Properties of 2S-O Aluminum. I. Rozalsky. *American Society for Metals, Transactions*, v. 47, *Preprint No.* 7, 1954, 28 p.

Strain states were held identical for all specimens. Effects of compression and biaxial tension in prestrain stress state. Diagrams, graphs, photographs. 12 ref.
(Q27, Al)

995-Q. Deformation Mechanisms in Polycrystalline Aggregates of Magnesium. F. E. Hauser, C. D. Starr, L. S. Tietz and J. E. Dorn. *American Society for Metals, Transactions,* v. 47, *Preprint No.* 8, 1954, 34 p.

Studies at atmospheric temperatures by metallographic and X-ray techniques. Micrographs, pole figures, tables, graphs, diagrams. 20 ref. (Q24, Mg)

996-Q. Tensile and Impact Properties of Low Carbon Martensites. C. C. Busby, H. W. Paxton and M. F. Hawkes. *American Society for Metals, Transactions,* v. 47, *Preprint No.* 9, 1954, 22 p.

Mechanical properties of 38 specimens in the as-quenched and quenched and tempered conditions. Tables, graphs, micrographs. 4 ref. (Q27, Q6, ST)

997-Q. The Zonal Rolling Texture of Low Carbon Steel Cold-Rolled at Various Temperatures. C. Nusbaum and William Brenner, Jr. *American Society for Metals, Transactions,* v. 47, *Preprint No.* 12, 1954, 16 p.

Data from production samples showing effects of mill temperatures. Tables, diffraction patterns, graphs. 9 ref. (Q24, CN)

998-Q. Influence of Substructure on the Shape of the Creep Curve. Thomas H. Hazlett and Rosa D. Hansen. *American Society for Metals, Transactions,* v. 47, *Preprint No.* 20, 1954, 10 p.

Tests on nickel and nickel alloys show that substructure has a marked effect on creep behavior. Graphs, table. 9 ref. (Q3, Ni)

999-Q. The Elastic Limit and Yield Behavior of Hardened Steels. Hugh Muir, B. L. Averbach and Morris Cohen. *American Society for Metals, Transactions,* v. 47, *Preprint No.* 23, 1954, 24 p.

Dependence of mechanical properties of carbon steels on tempering temperature. Diagram, tables, graphs. 16 ref. (Q21, Q23, CN)

1000-Q. Effect of Composition on Transverse Properties of Slack-Quenched Steel. John Vajda and Paul E. Busby. *American Society for Metals, Transactions,* v. 47, *Preprint No.* 24, 1954, 15 p.

Effects of boron, rare earth oxides, silicon, nickel and carbon on hardenability and mechanical properties. Table, graphs. 2 ref. (Q general, J26, AY)

1001-Q. The Statistical Fatigue Properties of Lamellar and Spheroidal Eutectoid Steel. G. E. Dieter, R. F. Mehl and G. T. Horne. *American Society for Metals, Transactions,* v. 47, *Preprint No.* 25, 1954, 19 p.

Effects of carbide morphology on specimens with various heat treatments. Evidence indicates fatigue cracks are not initiated by carbide particles. Tables, graphs, micrographs. 19 ref. (Q7, CN)

1002-Q. Effect of Static Stress on the Damping of Some Engineering Alloys. A. W. Cochardt. *American Society for Metals, Transactions,* v. 47, *Preprint No.* 26, 1954, 12 p.

Damping increases with static stress for nonmagnetic materials and decreases for magnetic alloys. Tests were made from 70 to 1300° F., 910 to 51,000 psi. static stress, and 0 to 40,000 psi. vibrational torsion. Diagrams, table, graphs. 11 ref. (Q8, SS, Fe, Ni, Co, Cr)

1003-Q. The Effect of Deformation on the Martensitic Transformation in Austenitic Stainless Steels. H. C. Fiedler, B. L. Averbach and Morris Cohen. *American Society for Metals, Transactions,* v. 47, *Preprint No.* 30, 1954, 19 p.

M^S temperature of 18-8 decreased markedly with increasing carbon. Small plastic strains stimulate transformations during cooling while large strains stabilize or suppress it. Tables, graphs, micrographs. 23 ref. (Q24, N8, SS)

1004-Q. Elevated Temperature Properties of Ductile Cast Irons. Charles R. Wilks, Norman A. Matthews and R. Wayne Kraft, Jr. *American Society for Metals, Transactions,* v. 47, *Preprint No.* 34, 1954, 21 p.

Tests on three types of ductile iron from 800 to 1200° F. Tables, micrographs, diagram, graphs. 7 ref. (Q general, CI)

1005-Q. Effect of Cold Work on the High Temperature Creep Properties of Dilute Aluminum Alloys. Robert E. Frenkel, Oleg D. Sherby and John E. Dorn. *American Society for Metals, Transactions,* v. 47, *Preprint No.* 35, 1954, 16 p.

New recovery model derived from experimental data. Principal effect of cold work is to reduce the stress parameter in the equation for creep rate. Tables, graphs, X-ray patterns. 15 ref. (Q3, Al)

1006-Q. Creep-Tempering Relationships in Hardened 4.5 Per Cent Chromium Steels. E. C. Roberts, N. J. Grant and Morris Cohen. *American Society for Metals, Transactions,* v. 47, *Preprint No.* 36, 1954, 16 p.

Interrelations of tempering reactions and creep characteristics from 800 to 1300° F. Tables, graphs, micrographs. 12 ref. (Q3, J29, AY)

1007-Q. The Strength of Wrought Zirconium-Base Binary Alloys at 1800 to 2200° F. H. A. Saller, J. T. Stacy and S. W. Porembka. *American Society for Metals, Transactions,* v. 47, *Preprint No.* 37, 1954, 14 p.

Effects of chromium, columbium, molybdenum, tantalum, tungsten and vanadium additives on workability, hardness and high-temperature strength. Diagram, tables, graphs. 8 ref. (Q23, Q24, Q29, Zr, Cr, Cb, Mo, Ta, V, W)

1008-Q. Effects of Cold Work on Cementite in Steel. D. V. Wilson. *American Society for Metals, Transactions,* v. 47, *Preprint No.* 38, 1954, 27 p.

Magnetic and X-ray diffraction studies explain change of Curie point by cold work. Diagram, table, graphs. 17 ref. (Q24, P16, CN)

1009-Q. New Techniques for Measuring Forces and Wear. Warren P. Mason. *Bell Laboratories Record,* v. 32, Oct. 1954, p. 375-378.

Use of a barium titanate piezoelectric ceramic for measuring dynamic forces in telephone switching apparatus. Fundamentals of wear testing. Diagrams, oscillograms, circuits, graph, photograph. 1 ref. (Q9)

1010-Q. Machine Design for Cyclic Stress. II. J. S. Caswell. *Engineer,* v. 198, Sept. 10, 1954, p. 346-349.

Characteristics and effects of cyclic stressing with reference to use of base diagrams for design purposes. Diagrams, stress patterns, graphs. 20 ref. (To be continued.) (Q25)

1011-Q. Machine Design for Cyclic Stress. III. J. S. Caswell. *Engineer,* v. 198, Sept. 17, 1954, p. 378-381.

Characteristics and effects of cyclic stressing. Use of base diagrams for design purposes. Serious effects of stress concentration, and new formulas for use in cyclic stress design. Table, diagrams. 20 ref. (Q25)

1012-Q. The Yield Point in Steel. A Call to Improve the Quality of Sheets. G. Murray. *Engineering,* v. 178, Sept. 17, 1954, p. 366-369.

Effect of yield point in pressing. Methods for removing the yield point of sheets. Effect of internal stresses and lattice dislocations on yield point. Photographs, graphs, diagram, micrographs. (Q23, CN)

1013-Q. Proposed Tentative Method of Rapid Indentation Hardness Testing of Metallic Materials. *Foundry,* v. 82, Oct. 1954, p. 228.

ASTM designation E-54T as a data sheet. (Q29, S22)

1014-Q. A Study of the Impact of Spheres on Plates. J. P. A. Tillett. *Physical Society, Proceedings,* v. 67, no. 417B, Sept. 1954, p. 677-688.

Measurements of the coefficient of restitution for the impact of steel balls on plates of glass and plastics. Diagram, table, graphs. 16 ref. (Q6)

1015-Q. Applicability of Charpy Test Data. P. P. Puzak, M. E. Schuster and W. S. Pellini. *Welding Journal,* v. 33, Sept. 1954, p. 433S-441S.

Relation of performance in crack starter tests to Charpy V test data. Fracture propagation is difficult in welded structures of rimmed and semikilled steels at temperatures which show 20 ft-lb. Charpy V energy but higher values are indicated for fully killed steels. Table, graphs, photographs, diagrams. 5 ref. (Q6, CN)

1016-Q. Effect of Oxygen on Welding and Brazing Molybdenum. Timothy Perry, H. S. Spacil and John Wulff. *Welding Journal,* v. 33, Sept. 1954, p. 442S-448S.

Influence of oxygen on the mechanical properties of heat treated molybdenum related to welding and brazing. Tables, photograph, micrographs, graph. 26 ref. (Q general, K general, Mo)

1017-Q. (English.) Measurement of Dynamic Stress on the Electric Overhead Travelling Crane Girder. Noboru Onishi and Yasushi Kawakatsu. *Hitachi Review,* 1954, no. 6, July, p. 79-88.

Stress measurement of lifting action of load on 10-ton crane girder by photo cell-type strain gage. Diagrams, tables, photograph. 5 ref. (Q25)

1018-Q. (German.) Electro-Acoustic Testing of Materials. H. H. Rust. *Metall,* v. 8, nos. 17-18, Sept. 1954, p. 681-683.

Measurements of elasticity moduli and small changes in length of test rods, based on the excitation of longitudinal vibrations of test rods in their inherent frequency. Graphs, diagrams. 8 ref. (Q21)

1019-Q. (German.) The Continuous Determination of Internal Stresses in a Solid Metal Cylinder. H. Buhler and W. Schreiber. *Metall,* v. 8, nos. 17-18, Sept. 1954, p. 687-691.

Experimental method using chips obtained by surface machining and by drilling. Mathematical evaluation of results. Graphs, tables. 13 ref. (Q25)

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Effect of range of stress on fatigue properties of rotating-beam specimens. Full range of loading from pure tension to pure bending in any combination can be obtained. Photograph, diagrams, graphs, oscillograph, nomograph, tables. (Q7)

1021-Q. Treatment of Tension Test Specimens for Fixing in Testing Machine. H. Krenchel. *ASTM Bulletin,* 1954, no. 200, Sept., p. 44-46.

Plastic coatings prevent slip of specimens held by jaws of testing

machines in static and fatigue tests. Photographs, diagram. (Q27, Q7)

1022-Q. Thermoelectric Power and the Bauschinger Effect. R. L. Woolley. *Nature,* v. 174, Sept. 18, 1954, p. 566-567.

Thermo-electric power and electric resistance tests on copper indicate that during Bauschinger strain the total disorder in the lattice does not increase but is merely re-arranged. 3 ref. (Q24, P15, Cu)

1023-Q. (French.) Observations on the Elastic Range of Steels. Robert de Strycker. *Revue de métallurgie,* v. 51, no. 8, Aug. 1954, p. 551-557; disc., p. 557.

Deformation produced in basic bessemer mild steels under stresses very close to the lower elastic limit. Diagrams, graphs, table. 4 ref. (Q21, CN)

1024-Q. (French.) Examining Mechanical Properties of Steels by Magnetic Methods. P. E. Lagasse. *Revue universelle des mines,* v. 10, ser. 9, no. 9, Sept. 1954, p. 608-616.

Magnetic state of a steel specimen being a function of its crystalline state and texture, it is possible to interpret, to a certain degree, changes in magnetic state observed during mechanical or heat treatments. Graphs, diagrams, photograph. 14 ref. (Q general, P16, ST)

1025-Q. (German.) Creep and Relaxation Processes in Steel Wires in Concrete Beams. Hans Umstätter. *Zeitschrift für Metallkunde,* v. 45, no. 8, Aug. 1954, p. 469-475.

Theoretical principles. Sensitive electro-acoustical method of investigating above as functions of time, temperature, wire diameter and hardness. Graphs, diagrams, photographs. 3 ref. (Q3, ST)

1026-Q. (German.) Kinematics of Plastic Creep. Some Model Observations. Walther Kossel. *Zeitschrift für Metallkunde,* v. 45, no. 8, Aug. 1954, p. 476-483.

Theoretical considerations of nature of slip and its relation to crystal growth. Factors which influence type and extent of slip. Diagrams. 8 ref. (Q3, Q24)

1027-Q. (German.) Graphic Presentations of Shear-Stress Conditions in Cubic Face-Centered Crystals. Jörg Diehl, Max Krause, Werner Offenhäuser and Wolfgang Staubwasser. *Zeitschrift für Metallkunde,* v. 45, no. 8, Aug. 1954, p. 489-492.

Means of determining axis of shear stresses from tensile deformation in any slip system and for any orientation of cubic face-centered metal crystals. Graphs, diagrams, table. (Q2, Q24, M26)

1028-Q. (Russian.) Vibrationless Dry Surface Friction of Metals at Low Velocities. N. F. Kunin and G. D. Lomakin. *Zhurnal Tekhnicheskoi Fiziki,* v. 24, no. 8, Aug. 1954, p. 1361-1366.

Relation of static and dynamic friction coefficients and connection between vibrationless friction and the dynamic coefficient of seizing for iron-copper, tin-iron and aluminum-iron pairs. Graphs, table. 10 ref. (Q9, Fe, Sn, Cu, Al)

1029-Q. (Russian.) The Coefficient of Transverse Deformation in the Elastic Region. A. V. Gurev. *Zhurnal Tekhnicheskoi Fiziki,* v. 24, no. 8, Aug. 1954, p. 1441-1447.

Experimental data show that Poisson's ratio does not change with carbon content of the steel. A new material constant is introduced based on the nonuniformity of micro-elements in the plastic state. Tables, graphs. 6 ref. (Q21, ST)

1030-Q. (Russian.) Strength of Metals in Contact With Fused Solders. S. T. Kishkin, V. V. Nikolenko and S. I. Ratner. *Zhurnal Tekhnicheskoi Fiziki,* v. 24, no. 8, Aug. 1954, p. 1455-1466.

Influence of composition and contact time of various solders on brittle fracture of steels in tension. Beneficial effects of copper or nickel sublayers. Tables, graphs, diagrams, micrographs. 4 ref. (Q26, K7, ST)

1031-Q. (Pamphlet.) Correlation of Rupture Data for Metals at Elevated Temperatures. Report no. PB111348. 30 p. 1953. Office of Technical Services, U. S. Dept. of Commerce, Washington 25, D. C. $1.00.

Correlation of stress-rupture data for pure metals and alloys. Relation of time-to-rupture and test temperature and stress for several metals and alloys. (Q4)

1032-Q. (Pamphlet.) The Correlation of High Temperature Rupture Data for Niobium. Report no. PB 111349. 10 p. 1953. Office of Technical Services, U. S. Dept. of Commerce, Washington 25, D. C. $1.00.

Prediction of rupture strength from a limited number of tests. (Q4, Cb)

1033-Q. (Book.) Strength of Materials. Arthur Morley. 11th Ed. 532 p. 1954. Longmans, Green and Co., Ltd., 43 Albert Drive, London, S.W. 1, England.

Fatigue, criteria of elastic strength, creep, metallurgical developments of non-ferrous metals, and use of strain energy and theorems related to it for determination of elastic deformations. (Q general)

R

Corrosion

438-R. Cathodic Protection for the Fleet. Jack Driller. *Bureau of Ships Journal,* v. 3, Sept. 1954, p. 14-17.

Systems used and work in progress. Diagram, photographs. (R10)

439-R. Corrosion Inhibitors and Polarographic Maxima. Harry C. Gatos. *Electrochemical Society, Journal,* v. 101, Sept. 1954, p. 433-441.

Results of polarographic studies of number of corrosion inhibitors, particularly for the iron-sulfuric acid system. Graphs, photograph, tables. 19 ref. (R10, Fe)

440-R. Corrosion Properties of Titanium in Marine Environments. H. B. Bomberger, P. J. Cambourelis and G. E. Hutchinson. *Electrochemical Society, Journal,* v. 101, Sept. 1954, p. 442-447.

Behavior of commercially pure titanium and several common structural metals exposed up to five years at Kure Beach, N. C. Tables, photographs. 12 ref. (R3, R4, Ti)

441-R. Jet Impingement Tests. P. T. Gilbert and F. L. LaQue. *Electrochemical Society, Journal,* v. 101, Sept. 1954, p. 448-455.

Studies of failure of certain condenser tube alloys as a result of corrosion-erosion produced by salt water moving at moderately high velocity. Tables, photographs. 7 ref. (R1, R4, Ni, Cu)

442-R. The Utility of Thermodynamic Interpretation of Polarization Curves. Marcel Pourbaix. *Electrochemical Society, Journal,* v. 101, Sept. 1954, p. 217C-221C.

Discussion and application to prediction of conditions of corrosion and passivity of metals and alloys. Behavior of mild steel in a bicarbonate medium, behavior of stainless steel in acetate buffer, influence of chlorides, action of chlorides on the corrosion of iron and the remedy for this action and prevention of localized corrosion. Diagrams, graphs. 19 ref. (R10, R11, ST)

443-R. Corrosion. Mars G. Fontana. *Industrial and Engineering Chemistry,* v. 46, Sept. 1954, p. 85A-86A, 88A.

Oxidizing effects of aeration and expressions for corrosion rate. Graphs. (R10)

444-R. How to Prevent Stress-Corrosion-Cracking in Aluminum Parts. R. N. Hooker and J. L. Waisman. *Iron Age,* v. 174, Sept. 9, 1954, p. 123-125; Sept. 16, p. 165-167.

Improved design, use of forgings, low stress levels and coatings are factors to consider. Photographs, micrographs, charts. (R1, Al)

445-R. Maintenance Aspects of Corrosion Program at Fairless Works. K. L. Johannsen. *Iron and Steel Engineer,* v. 31, Sept. 1954, p. 115-121; disc., p. 121-122.

Design and maintenance problems in preventing underground corrosion in large installation. Diagrams, photographs, tables, graphs. 6 ref. (R8)

446-R. Present Status of Cavitation Research. Robert T. Knapp. *Mechanical Engineering,* v. 76, Sept. 1954, p. 731-734.

Review of effect of cavitation on performance of hydraulic devices and losses from mechanical and corrosion damage. 6 ref. (R2)

447-R. Stressed Alpha Brass in Sea Water and Ammonia. A. R. Bailey and W. H. Lowther. *Metal Industry,* v. 85, Aug. 13, 1954, p. 126-127.

Relationship between marine environment and stress-corrosion cracking. 21 ref. (R1, R4, Cu)

448-R. Season Cracking of Brass. H. A. Unckel. *Metal Industry,* v. 85, Aug. 27, 1954, p. 167-168.

Causes and mechanism of stress-corrosion cracking. Photograph. 6 ref. (R1, Cu)

449-R. Some Aspects of Stress Corrosion Cracking. Thomas P. May. Paper from "Yearbook of the American Iron and Steel Institute", p. 206-213; disc., p. 213.

Possible mechanisms and role of hydrogen. Suggests study of relation of chloride ion in corrosion of stainless steels. 14 ref. (R1, ST)

450-R. (Dutch.) Cathodic Protection Against Corrosion. T. van der Klis. *Bedrijf en Techniek,* v. 9, no. 208, Aug. 14, 1954, p. 380-383.

Protection of metals embedded in the soil against electrochemical corrosion. Diagrams. 8 ref. (R10)

451-R. (French.) Test on the Application of Magnetic Fields to Scaling Problems. Jean Pajot. *Flamme et Thermique,* v. 7, no. 66, Mar. 1954, p. 43, 45.

Phenomena occurring when a solution is passed through a strong magnetic field, causing a slimy deposit. (R2, R11)

452-R. (Italian.) Preliminary Research Concerning the Possible Influence of Bacterial Metabolism on the Corrosion of Aluminum Caused by Stagnating Water. L. Ranucci-Gatto. *Alluminio,* v. 23, no. 4, 1954, p. 399-411.

Effects of sulfur-reducing bacteria. Photographs, tables, graphs. 11 ref. (R1, R4)

453-R. Stress-Corrosion Mechanism in a Magnesium-Base Alloy. D. K. Priest, F. H. Beck and M. G. Fontana. *American Society for Metals, Transactions,* v. 47, *Preprint No.* 18, 1954, 16 p.

Tests at room temperature in sodium chloride-potassium chromate

solution on a Mg-Al-Zn alloy show effects of heat treatment, grain size, lattice orientation, cathodic protection and pH. Diagrams, graph, photograph, micrographs, tables. 11 ref. (R1, Mg)

454-R. Cathodic Protection Fighting Corrosion Underground. Maurice A. Riordan. *Consulting Engineer,* v. 4, Sept. 1954, p. 58-61.

Components of cathodic protection systems, applications, costs. Diagrams, photographs, graph. (R10)

455-R. (German.) Corrosion-Retarding Effect of Red Lead Cyanamide. Hans-J. Schuster and J. D'Ans. *Naturwissenschaften,* v. 41, no. 16, Aug. 1954, p. 373.

Electrical measurements made to determine possible electrochemical reasons for above effect. (R10, R11)

456-R. (German.) Special Steels for Use in the Construction of High-Pressure Plant in the Chemical Industry. Immanuel Class. *Werkstoffe und Korrosion,* v. 5, nos. 8-9, Aug.-Sept. 1954, p. 281-285.

Corrosion and mechanical properties of steel commonly used in corrosive atmospheres and high temperatures. Tables. 21 ref. (R general, Q general, T26, ST)

457-R. Aluminium Roofing in Severe Conditions of Service. *Petroleum Times,* v. 58, Sept. 17, 1954, p. 959-961.

Case histories of atmospheric corrosion in the petroleum industry. Aluminum roofing is successfully withstanding conditions that would have brought about the rapid failure of more conventional materials. Graphs, photograph. (R3, T26, Al)

458-R. (Book.) Petroleum Microbiology. Ernest Beerstecher, Jr. 375 p. 1954. Elsevier Press, Inc., 402 Lovett Blvd., Houston 6, Tex.

Role of micro-organisms in geological processes, petroleum synthesis and utilization, and corrosion; activity in drilling muds and petroliferous formations; effects of hydrocarbons on micro-organisms. (R1)

S

Inspection and Control

353-S. Statistical Quality Control for the Foundryman. Ross Martin, Jr. *American Foundryman,* v. 26, Sept. 1954, p. 50-55.

Based on a mathematical foundation, technique is developed to enable better decisions to be made for production on a higher quality level. Graphs. (S12, E general)

354-S. New Wrought-Aluminum Designations. I. *American Machinist,* v. 98, Sept. 13, 1954, p. 187, 189.

Adoption of new system of alloy designations for wrought aluminum and aluminum alloys. Old-to-new and new-to-old conversion tables. Tables. (S22, Al)

355-S. A Thermostat With Control Temperature Independent of Ambient Temperature. A. M. Thompson and R. W. Archer. *Institution of Electrical Engineers, Proceedings,* v. 101, pt. 2, no. 82, Aug. 1954, p. 450-452.

Circuit for precise temperature control of oven for crystal frequency standard. Circuits, diagrams. 6 ref. (S16)

356-S. Acceptance Standards for Magnetic Inspection Improve Quality, Lower Rejection Rates on Critical Parts. Stephen Maszy. *Iron Age,* v. 174, Sept. 23, 1954, p. 114-115.

Examples of realistic acceptance standards. Diagrams. (S13, S22, ST)

357-S. Compact Radiographic Inspection Setup Combines Safety With Good Handling. J. A. Kearney and J. P. Brennan. *Iron Age,* v. 174, Sept. 9, 1954, p. 128-130.

Use of X-ray and cobalt-60 isotope in quality control. Photographs, diagram. (S13)

358-S. Ultrasonics in Maintenance Planning and Product Quality Control. R. L. Rectenwald. *Iron and Steel Engineer,* v. 31, Sept. 1954, p. 77-85; disc., p. 85-87.

Equipment, techniques and applications of ultrasonic nondestructive testing. Photographs, diagrams. 3 ref. (S13)

359-S. New Numbering System for Wrought Aluminum Alloys. *Metal Progress,* v. 66, Sept. 1954, p. 112B.

Data sheet showing conversions, new to old and old to new. (S22, Al)

360-S. Inspection of Metals With Ultrasonic Surface Waves. Willard C. Minton. *Nondestructive Testing,* v. 12, July-Aug. 1954, p. 13-16.

Theory and techniques for detecting various types of defects. Diagrams, graphs, table, photograph. 6 ref. (S13)

361-S. Factors in the Use of Black Lights for Fluorescent Inspection. J. E. Clarke. *Nondestructive Testing,* v. 12, July-Aug. 1954, p. 21-25.

Light sources, intensity requirements and operation, care and maintenance of equipment. Diagram, graphs. (S13)

362-S. Further Investigations on the Industrial Use of the 31-MEV Betatron. R. Wilderoe. *Nondestructive Testing,* v. 12, July-Aug. 1954, p. 27-32.

Applications, advantages and limitations of betatron rays. Advantages of stereo-radiographs. Diagrams, graphs. 9 ref. (S13)

363-S. Trends in Testing Techniques. Don M. McCutcheon. *Nondestructive Testing,* v. 12, July-Aug. 1954, p. 33-40.

Theory, practice and characteristics of various classes of nondestructive tests. Photographs, tables, micrograph, graphs, oscillographs. 12 ref. (S general)

364-S. Gamma-Radiography in Oil Storage Installations. II. C. C. Bates. *Petroleum,* v. 17, Sept. 1954, p. 312-314, 342.

Nondestructive testing of welds. Photographs, diagrams. (To be continued.) (S13, K9, CN)

365-S. (German.) Rapid Electrographic Identification of Alloy Steels and Alloys of the Ferrous Metals. Erich Fitzer. *Archiv für das Eisenhüttenwesen,* v. 25, nos. 7-8, July-Aug. 1954, p. 321-326.

Semiquantitative method of determining Cr, Co, Ni, Mn, Mo, W, Si, Fe and Cu in steels and cast irons and description of an industrially feasible instrument. Diagrams, charts. 16 ref. (S10, AY)

366-S. (German.) Magnetic and Electromagnetic Sorting of Semifinished Steel Parts and Parts Produced by Mass Production. Friedrich Förster. *Archiv für das Eisenhüttenwesen,* v. 25, nos. 7-8, July-Aug. 1954, p. 383-392.

Methods of sorting steel parts according to conductivity, hardness, and defects. Diagrams, photographs, and graphs. 21 ref. (S10, ST)

367-S. Factors Governing the Surface Finish of Iron Castings. J. H. Gittus. *British Cast Iron Research Association. Journal of Research and Development,* v. 5, Aug. 1954, p. 376-389 + 2 plates.

Cause and measurement of casting roughness. Diagrams, graphs, photograph, tables. 19 ref. (S15, E25, CI)

368-S. Thickness Gauge for Dielectric Materials. W. W. Woods. *Communication and Electronics,* 1954, Sept., p. 320-323.

Instrumentation based upon variation of mutual induction between two coils when brought near a metal surface. Diagram, graphs. 8 ref. (S14)

369-S. Eddy-Current Testing: A New Tool Makes Inspection Automatic. Richard Hochschild. *Control Engineering,* v. 1, Oct. 1954, p. 35-41.

Principle of device, applications, flexibility and versatility. Graphs, diagrams, circuit diagrams, photograph, table. (S13)

370-S. Melting Control of Electric Furnace Steel With a Direct-Reading Spectrometer. George C. Delplace. *Electric Furnace Steel Proceedings,* v. 11, 1953, p. 77-79.

Analytical procedure, elements determined and sampling. (S11, S12, AY, CN)

371-S. Validity of Results of Rapid Methods of Analysis for High-Alloy Steels. M. L. Windle and W. H. Magrun. *Electric Furnace Steel Proceedings,* v. 11, 1953, p. 87-91.

Discussion of choice of analytical methods and degree of accuracy and relations to production control. Tables. (S11, AY)

372-S. Measurement of Bottom Shell Temperature in the Electric Furnace. D. G. Harris. *Electric Furnace Steel Proceedings,* v. 11, 1953, p. 91-94.

Basic principle of new method and test results. Diagrams, graph. (S16, D5)

373-S. Measurement of Bottom Shell Temperatures. H. C. Bigge. *Electric Furnace Steel Proceedings,* v. 11, 1953, p. 95-100.

Importance of fabrication of rammed linings and bottom thermocouple. Diagrams, graphs. (S16, D5)

374-S. Tentative Specifications for Ferromanganese. *Foundry,* v. 82, Oct. 1954, p. 227.

ASTM designation A99-53T as a data sheet covering seven grades. (S22, B22, Fe, Mn)

375-S. Automatic Radiography With Cobalt-60. Jack Hile. *Materials & Methods,* v. 40, Sept. 1954, p. 108-109.

Unique method developed to check soundness of 2000 compressor blades. Photographs. (S13)

376-S. Nondestructive Testing Detects Corrosion Damage. F. A. Prange and J. F. Headrick. *Oil and Gas Journal,* v. 53, Sept. 27, 1954, p. 82.

Ultrasonic methods of measuring wall thickness of pressure equipment in petroleum refineries. (S14, R7)

377-S. (German.) Optical Instruments for the Testing of Materials and Surface Investigations. A. Metz. *Metall,* v. 8, nos. 17-18, Sept. 1954, p. 677-680.

Design, operation and performance of the "Metallux" microscope, the Bollenrath dilatometer, the "Durimet" hardness tester, a light-slot instrument and a surface-testing apparatus with a vibrating pickup. Photographs, diagram. (S15, S13)

378-S. (German.) X-Ray Equipment for X-Ray Testing of Materials. H. Link. *Metall,* v. 8, nos. 17-18, Sept. 1954, p. 684-687.

Portable and stationary equipment for nondestructive testing—performance and operation. Comparison with equipment using radioactive isotopes. Photographs. (S13)

379-S. Observations on the Application of Statistical Techniques to ASTM Standards. Charles A. Bicking. *ASTM Bulletin,* 1954, no. 200, Sept., p. 48-52.

Reviews advances made in applying statistical techniques to standardization of industrial products. Tables. 9 ref. (S12, S22)

380-S. (French.) Flaw Detections in Metal Tubes by Means of Induced Electric Currents. G. Gauthier. *Revue de métallurgie,* v. 51, no. 8, Aug. 1954, p. 537-540.

Anomalies in diagrams produced by the electric-current tests. Micrographs, diagram. (S13)

381-S. (French.) Some Applications of Ultrasonic Testing of Rails. L. Beaujard and V. Husarek. *Revue de métallurgie,* v. 51, no. 8, Aug. 1954, p. 558-568.

Reviews experiments in which ultrasonic methods of examination revealed presence of defects due to fatigue (oval spots, horizontal fissures due to scaling) or defects already existing in the rail (longitudinal or vertical faults). Photographs, diagrams, graphs. 8 ref. (S13, Q7, CN)

382-S. (Book.) ASTM Specifications for Steel Piping Materials. 370 p. American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa. $3.75.

Specifications for carbon and alloy steel pipe and tubing in conveying liquids, gases and vapors; boiler, superheater and still tubes; heat exchanger and condenser tubes; and for castings, forgings, welded fittings, bolts and nuts. Classification of austenite grain size in steels and American standard covering wrought steel and wrought iron pipe. (S22, ST, AY)

T
Applications of Metals in Equipment

279-T. Current Development of Aircraft Production Processes. J. V. Connolly. *Aircraft Engineering,* v. 26, Sept. 1954, p. 272-287, 291.

Survey of developments of recent years and techniques likely to become important in the future. Diagrams, tables, photographs. (T24)

280-T. Progress in Magnesium Plates. Keith Johns. *Bookbinding & Book Production,* v. 60, Sept. 1954, p. 67-69, 72.

Advantages, costs and applications of magnesium printing plates. Photographs. (T9, Mg)

281-T. Marine High Duty Cast Iron Replaces Steel. E. C. Pigott. *Iron & Steel,* v. 27, Sept. 1954, p. 441-445.

Factors influencing selection and foundry procedure for gray iron in steam lines. Photographs, tables, graphs. (T22, E general, CI)

282-T. The Use of Light Metals in Naval Design. Roy E. Scherman. *Light Metals,* v. 17, Sept. 1954, p. 300-301.

Applications in Swedish Navy. (T22, Al)

283-T. Some Current Applications of Powder Metallurgy. *Machinery (London),* v. 85, Aug. 13, 1954, p. 328-330.

Nonferrous and ferrous bushings, washers, cams, levers and other components. Graph, table, photographs. (T7, H general, ST, Cu, Ni)

284-T. Aluminum vs. Steel. III. *Modern Metals,* v. 10, Aug. 1954, p. 34 + 5 pages.

Competition in container, construction and prefabrication fields. Tables, photographs. (T10, T26, ST, Al)

285-T. Structural Uses for Sheet and Plate in Europe. Cedric Marsh. *Modern Metals,* v. 10, Aug. 1954, p. 68, 70-71.

Progress and problems in adapting techniques used with other materials and industries for aluminum in the building trade. Photographs, diagram. (T26, Al)

286-T. Aluminum in Telephone Cable Sheath. E. W. Reynolds. *Modern Metals,* v. 10, Aug. 1954, p. 76-79.

Design, production and advantages of Stalpeth cable sheath composed of steel, aluminum and polyethylene. Photographs, diagrams. (T1, Al, CN)

287-T. (German.) Aluminum Pistons in the Cylinders of Internal Combustion Engines. E. Koch. *Aluminium,* v. 30, nos. 8-9, Aug.-Sept. 1954, p. 333-340.

Maximum efficiency achieved in design stage and by suitable choice of alloy and maintenance of high order of dimensional accuracy during machining. Photographs, diagrams, tables, micrograph. 8 ref. (T7, G17, Al)

288-T. (German.) Aluminum Tubes for Heat Exchangers. G. Lenk. *Aluminium,* v. 30, nos. 8-9, Aug.-Sept. 1954, p. 346-354.

Survey of uses, technical and economic advantages, effect of coolant water, methods of protection and cleaning and design data. Photographs, tables, graph, diagram. 2 ref. (T25, Al)

289-T. (German.) Mining Cages of Light Metals. O. Hanefeld. *Aluminium,* v. 30, nos. 8-9, Aug.-Sept. 1954, p. 355-359.

Possibilities and limitations of application. Rust protection and riveting. Photographs, diagram. 1 ref. (T28, R general, K13, Al)

290-T. (German.) Pseudoconductivity Measurements on Germanium-Indium Alloy Rectifiers. Hans-Ludwig Rath. *Zeitschrift für Naturforschung,* v. 9a, nos. 7-8, July-Aug. 1954, p. 699-700.

Electrical characteristics of germanium-indium rectifiers with temperature. Graphs. 7 ref. (T1, P15, In, Ge)

291-T. An Evaluation of a V-6 Aluminum Engine. John R. Long and Donald H. Perry. *Automotive Industries,* v. 111, Sept. 15, 1954, p. 70-72.

Cast aluminum engine parts for automotive applications approaching an economic and engineering reality. Photographs, graph. (T21, Al)

292-T. Poppet Valves, Guides and Seats. I. A Survey of Valve Materials and General Design Features. *Automobile Engineer,* v. 44, Sept. 1954, p. 349-356.

Causes of and corrective measures for valve failure, processes in valve production, valve forms. Tables, diagrams, photographs, graph. (To be continued.) (T7)

293-T. Jet Engine Metallurgy. R. B. Johnson, Jr. *Electric Furnace Steel Proceedings,* v. 11, 1953, p. 45-54.

Operating temperatures of typical aircraft gas turbine and an outline of problems in regard to materials in certain engine components. Graphs, micrographs, photographs, diagram. (T25, Mg, Al, Cr)

294-T. Application of Metals and Alloys in Petroleum Refining. I. W. L. Nelson. *Oil and Gas Journal,* v. 53, Sept. 27, 1954, p. 117.

Metals that have been employed in equipment for corrosion service. Table. (T28, R7)

295-T. (German.) Mold Types in Electrotyping. Walter Hediger. *Fachhefte für die Chemiegraphie, Lithographie und den Tiefdruck,* 1954, no. 3, p. 93-101.

Survey of molding processes, metal matrices, wax, cellon and lead molds and silvered molds formed by the spray method. Diagrams. (T9, Ag)

V
Materials
General Coverage of Specific Materials

322-V. Corrosion Resistant Aluminium Bronze. R. J. T. Caney. *Australasian Engineer,* 1954, June, p. 54-69.

Composition, structure and properties of acid resistant alloys. Tables, graphs, micrographs. 10 ref. (Cu)

323-V. Titanium a Potential Ten Billion Dollar Civilian Industry. A. F. Cadenhead. *Canadian Metals,* v. 17, Sept. 1954, p. 16-17.

Demand, occurrence, properties and uses of titanium. (Ti)

324-V. Nimonic Alloy Developments. *Engineering,* v. 178, Sept. 3, 1954, p. 302-303.

Heat treatment and creep resistance, short-time high-temperature tensile properties, fatigue properties, extrusion and uses in gas-turbine blading. Diagrams, tables, graph. (J general, Q3, Q23, Q7, T25, Ni)

325-V. Ductile Iron Meets Heavy Duty Service Requirements. D. M. Marsh. *Iron Age,* v. 174, Sept. 9, 1954, p. 135-138.

Improved process control widens range of physical properties and permits its use in casting heavy duty machinery. Photographs, tables, graph. (Q general, T5, CI)

326-V. Aluminium Industry in India. A. L. Sabharwal. *Journal of Scientific & Industrial Research,* v. 13, sec. A, July 1954, p. 324-326.

1953 developments. 2 ref. (Al)

327-V. Permanent Magnet Alloys. J. Lomas. *Machinery Lloyd (Overseas Ed.),* v. 26, Aug. 14, 1954, p. 91-92.

Two types of vanadium-cobalt alloys investigated have good machinability, ductility and hardness qualities. Table. (SG-n, V, Co, Fe)

328-V. Titanium Technology in Mid-1954. H. T. Clark, J. P. Catlin and W. E. Gregg. *Mechanical Engineering,* v. 76, Sept. 1954, p. 716-720.

Production, melting, processing, alloy types, fabrication, creep and fatigue. Tables, graphs, diagram. (Ti)

329-V. Aluminum in France. T. L. Fritzlen. *Metal Progress,* v. 66, Sept. 1954, p. 113-114.

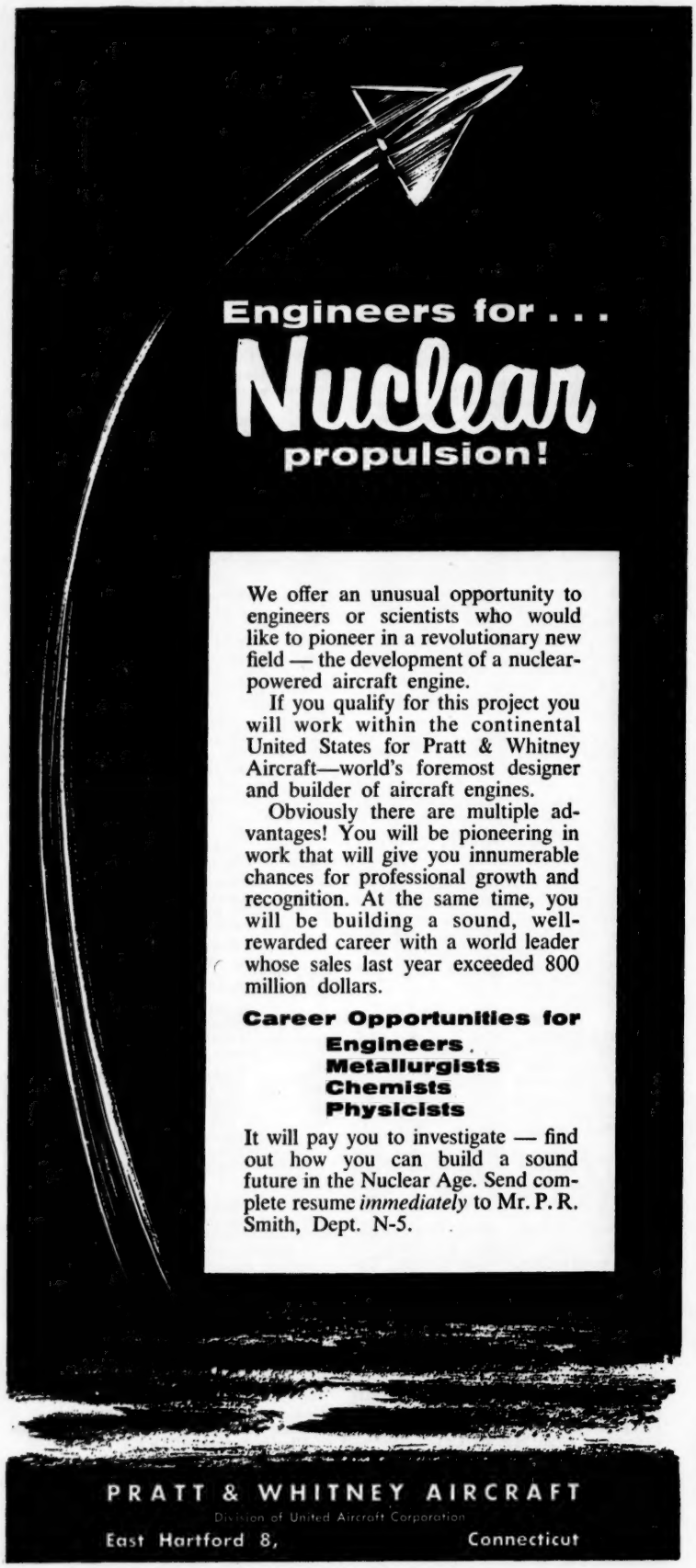
Report on production and application based on meetings, exposition and plant visitations in a centenary celebration in France of Deville's production of aluminum metal. Photographs. (Al)

330-V. Taming Titanium. Dave Adams. *Modern Metals,* v. 10, Sept. 1954, p. 35-36, 38, 41.

Results of tests on forming, welding, machining and annealing of commercially pure titanium sheet. Photographs. (Ti)

331-V. Stainless Steels in Brief. II. Grade Characteristics and Common Applications. Richard E. Paret. *Steel Processing,* v. 40, Sept. 1954, p. 575-578, 594.

Compositions, mechanical properties and corrosion resistance of



chromium and chromium-nickel steels. Tables, photographs. (SS)

332-V. (German.) Processing Castings of Zinc Alloys for New Fields of Application. Von Wolf Wolf. *Giesserei*, v. 41, no. 17, Aug. 19, 1954, p. 429-433.

Properties, casting, and machining of zinc alloys. Applications in machine parts, consumer goods and sheetmetal shaping dies. Tables, micrographs, photographs, diagram. 13 ref. (T general, Zn)

333-V. Manufacture of High-Temperature Alloys for Jet Engines. S. B. Batdorf and A. W. Hoppe. *Electric Furnace Steel Proceedings*, v. 11, 1953, p. 54-68; disc., p. 68-69.

Melting practices, casting and solidification, working, heat treatment. Photographs, graph, table, diagram, micrographs. 5 ref. (T25, SG-h)

334-V. New Sulfur-Bearing Tool Steels—a New Materials Preview. *Materials & Methods*, v. 40, Sept. 1954, p. 96-97.

Properties and machining characteristics. Photographs. (G17, TS)

335-V. New Non-Heat-Treatable Aluminum Alloy. *Materials & Methods*, v. 40, Sept. 1954, p. 147.

Alloy possesses good mechanical properties and weldability. Photograph. (Q general, K9, Al)

336-V. Investigations and Improvements of Drill Steel. *Mining Engineering*, v. 6, Sept. 1954, p. 889-893.

Review of research and developments in Canada and U. S. Laboratory tests, mechanisms of failures, spiral and pattern rolling methods. Tables, diagrams. (T6, TS)

337-V. Titanium. L. W. Smith. *Research Trends*, v. 2, Summer 1954, p. 7-11.

Production, properties, applications, fabrication problems. Graph, diagrams, photographs. (Ti)

338-V. Rexalloy 33. Hard, Wear Resistant Alloy. *Alloy Digest*, no. Co-6, Oct. 1954.

Composition, physical and mechanical properties, joining, corrosion resistance. (SG-m, W, Cr, Co)

339-V. Dowmetal-C. Heat Treatable Magnesium Casting Alloy. *Alloy Digest*, no. Mg-13, Oct. 1954.

Composition, physical and mechanical properties, heat treatment, machinability, weldability and corrosion resistance. (Mg)

340-V. Federated No. 2. Bearing Alloy. *Alloy Digest*, no. Sn-1, Oct. 1954.

Composition, physical and mechanical properties, chemical bonding and general characteristics. (SG-c, Sn, Sb, Cu)

341-V. Uniloy 19-9DL. Heat and Corrosion Resistant Alloy. *Alloy Digest*, no. SS-19, Oct. 1954.

Composition, physical and mechanical properties, heat treatment, machinability, weldability, corrosion resistance and applications. (SS)

342-V. Seneca. Hot Work Tool Steel. *Alloy Digest*, no. TS-25, Oct. 1954.

Composition, mechanical properties, heat treatment, machinability and applications. (TS)

343-V. Lehigh-H. Air-Hardening, High-Carbon, High-Chromium Tool Steel. *Alloy Digest*, no. TS-26, Oct. 1954.

Composition, mechanical properties, heat treatment and machinability. (TS)

344-V. (Book.) New High-Temperature Intermetallic Materials. Report no. PB111413. 91 p. 1953. Office of Technical Services, U. S. Dept. of Commerce, Washington 25, D. C. $2.00.

Preparation, testing, mechanical properties, and phase diagrams of various compounds including 95% Cr_2Ti and 5% Cr_2O_3. (SG-h)

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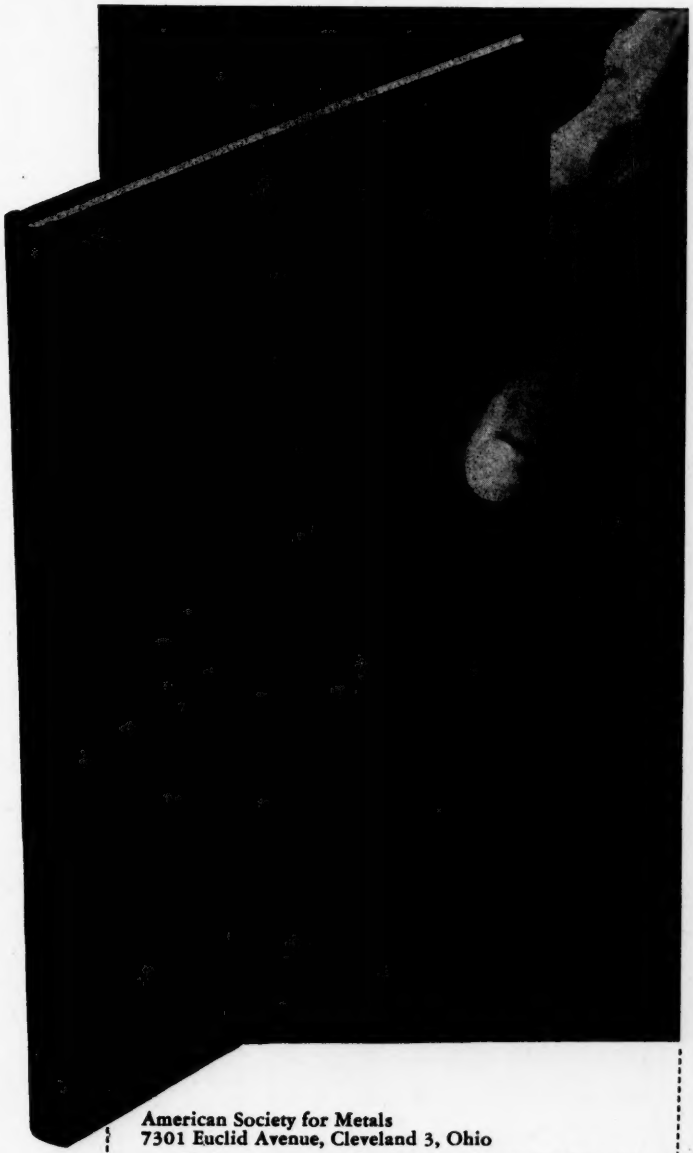

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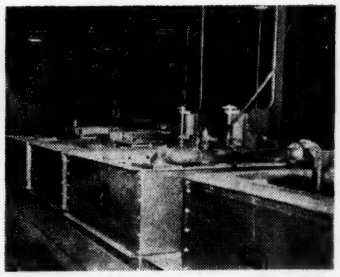

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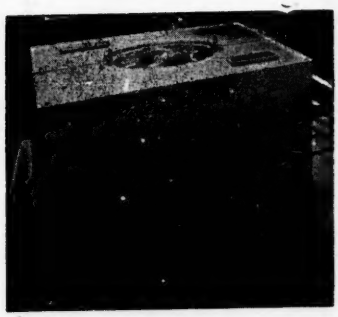

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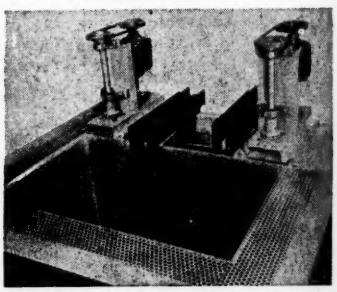

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